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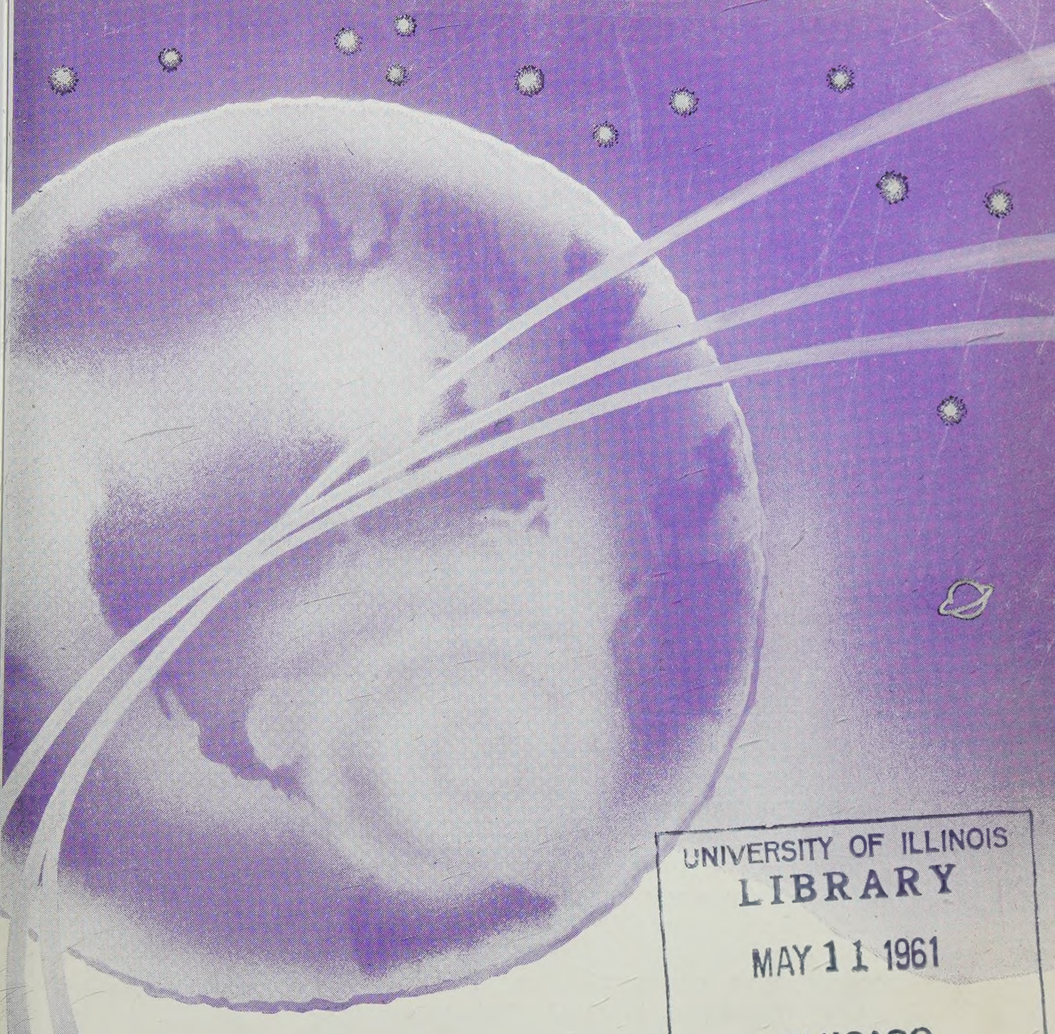

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Vol. 12 JANUARY 1961 No. 1

METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

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A. Current Abstracts in English on important meteorological and geoastrophysical literature in every language.

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C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists, geophysicists and astrophysicists.

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METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

MALCOLM RIGBY, Editor

Vol. 12 January 1961 No. 1

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Special Feature in This Issue

Annotated Bibliography on Aurora
By
Andrew J. Meglis

(For table of contents see back cover)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 45 Beacon Street, Boston 8, Mass.

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Men, my brothers, men the workers, ever reaping something new:
That which they have done but earnest of the things that they shall do:

For I dipt into the future, far as human eye could see,
Saw the Vision of the world, and all the wonder that would be;

Saw the heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight, dropping down with costly bales:

Heard the heavens fill with shouting, and there rain'd a ghastly dew
From the nations' airy navies grappling in the central blue;

Far along the world-wide whisper of the south-wind rushing warm
With the standards of the peoples plunging thro' the thunder-storm;

Till the war-drum throbb'd no longer, and the battle-flags were furl'd
In the Parliament of man, the Federation of the world.

There the common sense of most shall hold a fretful realm in awe,
And the kindly earth shall slumber, rapt in universal law.

From: **Locksley Hall**—TENNYSON, 1842

EDITORIAL

Devotees of the arts on the one hand and of science, on the other, must be constantly reminded of their common heritage and similarities of thought and interest lest they be misled by the pessimists and propagandists who would have us believe that astronomers and poets, for instance, are poles apart.

The above passage, so familiar to everyone 50 years ago, but almost unknown to the two generations preceding the recent "renaissance of learning," has exerted a tremendous influence on statesmen and world leaders in the development of aviation as well as in international relations. To some it seemed remarkably prophetic of the present age of aero- and astronautics, the aerial warfare of the second world war, current radioactive fallout and the very real though halting progress in international cooperation; ranking Tennyson along with Locke, Newton, Kant, Goethe, Franklin and many other Philosopher-Poet-Scientists who had great foresight as well as insight.

The fact that many of the best works of Tennyson, just as those of Shakespeare, Newton, Franklin and other great writers, contain a strange mixture of the sublime, the sentimental, the prophetic, the ridiculous and even the "corny", does not in any way detract from their lasting merit.

Not many of us have the mental and emotional equipment to allow our imaginations to get off of the ground and soar into the future "as far as human eye can see," but without some vision of the future, however vague; we merely drag along in the dirt or go round and round and get nowhere.

It is, therefore, a wise practice to periodically sit back and review the present situation and future prospects in the field of abstracting, indexing and information retrieval just as in any other endeavor.

It now appears that after over a decade of preparing the ground carefully for the much more effective documentation and retrieval service which is possible when one has:

1) A large amount of carefully indexed bibliographic material.
2) A detailed and versatile coding and identification system.
3) Specialized and economical machines capable of handling bibliographic material.

such a service can be rapidly brought to fulfillment. The speed with which this capability can be realized depends only on available time, effort and funds for working out the details. Of course, it takes months to get new equipment but in many instances more rapid progress can be made by leasing or using equipment owned or operated by some other service or institution.

851
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1961
Jan-June

Two major steps have been taken in the past months to "get off the ground" in this area of modernization through mechanization.

First, the conventional IBM print-punch and typewriter is being used as rapidly as possible for:

a) Compiling, up-dating and rearranging (for cross-referencing and thesaurus preparation) Subject Headings and other indexing terms and code numbers
b) Compiling monthly, annual and cumulative, subject, author and other indexes
c) Compiling and classifying periodical or serial lists
d) Searching or retrieving reference material on specific subjects

The second, and far more exciting, step has been the experimental use (through cooperative arrangement with the Chemical Abstracts Service) of an electronic computer (at present the IBM 704) for preparing indexes or concordances of terms contained in the titles of articles from recent periodicals, etc., now published without indexing in Part III of *MGA*.

By-products of this first run have been:

1) A frequency count of significant words in titles. This will help in selection of subject headings or indexing terms in preparing glossaries, etc.
2) A substantial beginning for a punched-card library for cumulative indexes and for retrieval
3) The possibility of systematic indexing (using the U.D.C. numbers and subject headings) by use of computers
4) The immediate possibility of print-outs of title listings and indexes for publication within 10 days or two weeks

These are possibilities for realization within a year or less.

Once off the ground, barring a crack-up on take-off, and without soaring too far into the 'wild blue yonder," it would be possible to set a goal involving a radically improved capability or processing and disseminating information on meteorological and geophysical literature, but nly because of what has been done in the past with an eye to what "we would do" if we had he opportunity.

Thus by 1970, it is reasonable to expect that equipment will be available and techniques eveloped for providing our scientists with:

1) Title listings and indexes within 10 days of receipt
2) Abstracts and class indexes within two weeks
3) Cumulative indexes within one month after end of period involved
4) Demand bibliographies on any general or specific subject
5) Regular Awareness Service in designated broad fields (on a monthly or fortnightly basis)
6) Subject heading lists and class schemes kept up to date and issued periodically by machine
7) Document and translation service on demand

Many of these developments will not necessarily fall within the scope of our activities or apabilities; however they are all interrelated so that developments along one line cannot be nade without some comprehension of possible applications along the other related lines, and ice-versa.

Such developments will not bring about a state where it will be possible to lie back and slumber, rapt in universal" complacency or contentment, for the literature will have doubled, he demands quadrupled, and the problems, therefore, magnified by an order of magnitude r more.

Malcolm Rigby

FOREWORD

Meteorological and Geoastrophysical Abstracts is a monthly publication devoted to current literature in meteorology, geophysics and astrophysics.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject. Bibliographies published in the successive issues were:

Vol. I, 1950

1. **Atmos. Pollution**
2. **Aerobiology**
3. **Cloud Physics**
4. **Hail**
5. **Tornadoes**
6. **Volcanic Dust**
7. **Climat. Changes**
8. **Thunderstorms**
9. **Icing**
10. **Acoust. Propagation**
11. **Evaporation**

Vol. II, 1951

1. **Extended Forecast.**
2. **Long Range Forecast.**
3. **Soil Temp.**
4. **Constants, etc.**
5. **Clim. of Near East**
6. **Clim. of Middle East**
7. **Special Winds**
8. **Radar Storm Detect.**
9. **Condensation Trails**
10. **Clim. of N. E. Africa**
11. **Mountain Met.**

Vol. III, 1952

1. **Clim. of N. W. Africa**
2. **Carbon Dioxide**
3. **Clim. of Argentina, etc.**
4. **Dew**
5. **Objective Forecast.**
6. **Stratus Forecast.**
7. **Urban Climatology**
8. **Clim. of C. Africa**
9. **Visibility**
10. **Glaze and Rime**
11. **Free Air Turbulence**

Vol. IV, 1953

1. **Turbulence Theory**
2. **Turbulent Diffusion**
3. **Frost**
4. **Clim. of Australia, etc.**
5. **High Level Winds**
6. **Winds in Stratosphere**
7. **Jet Stream**
8. **Radiation Bioclim.**
9. **Clim. of Pacific**
10. **Auroras**
11. **Sferics**

Vol. V. 1954

1. **Oceanog. Met.**
2. **Clim. of S. E. Asia**
3. **Auroral Physics**
4. **Tropopause**
5. **Balloons**
6. **Numerical Forecast.**
7. **Radiation Data**
8. **Vertical Motion**
9. **Clim. of Arctic**
10. **Industrial Met.**
11. **Wind Waves and Swell**

Vol. VI, 1955

1. **Bibliog. of Bibliog.**
2. **Texts & Monogr. Bibliogs.**
3. **Storm Surges**
4. **Ionospheric Prop.**
5. **Photochem.—Upper Atmos.**
6. **Cloud Physics**
7. **Radar Cloud Physics**

8–9. **Atmos. Nuclei**

10. **Weather Modification**
11. **Cooling Power**

Vol. VII, 1956

1. **Synoptic Met.-Arctic**
2. **Clim. of Enclosed Spaces**
3. **Cosmic Rays (–1952)**
4. **Cosmic Rays (1953–56)**
5. **Atmos. Radioactivity**
6. **Inversions**
7. **Snow Micromet.**
8. **Snow Micromet. (Suppl.)**

9–11. **Tropical Cyclones**

Vol. VIII, 1957

1. **Solar Weather Relations**
2. **Night Airglow**
3. **Forecasting Special Elements**
4. **Forest Micrometeorology**
5. **Hydromet. Forecasting**
6. **Numerical Forecast. (Suppl.)**
7. **Albedo**
8. **Meteors**

9–10. **Tropospheric Prop.**

11. **Medical Meteorology**

Vol. IX, 1958

1. **Radioastronomy**
2. **Solar Astrophysics**
3. **Radioactivity in Atmosphere**
4. **Waves and Currents**
5. **Physical Oceanog.**
6. **Dynamic & Phys. Oceanog.**
7. **Long Range Forecast.**
8. **Radar Met.**
9. **Cosmic Rays**

10–11. **Geomagnetism**

Vol. X, 1959

1. **Works of C. E. P. Brooks**
2. **Tornado Forecasting**
3. **Soil Moisture**
4. **Sferics**

5–6. **Ozone**

7. **Acoustic Waves**
8. **Evaporation Measurement**
9. **Evapotranspiration (–1955)**
10. **Evapotranspiration (1956–1959)**
11. **Evaporation**

Vol. XI, 1960

1. **Outstanding Reference Works**
2. **Outstanding Texts**
3. **Numerical Forecast. (Suppl.)**
4. **Ionospheric Physics**
5. **Ionospheric Propagation**
6. **Ionosphere**
7. **Forecast Verification**
8. **Radar Meteorology**
9. **Rocket Meteorology**
10. **Satellite Meteorology**
11. **Airglow**

Other bibliographies in preparation are:

Aurora
High Atmosphere Temperatures
Limnology
Physics of Lightning
Precipitation Chemistry
Twilight Phenomena

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

A. GENERAL

1. COLLECTED WORKS

See also: **Acoustical propagation in sea** (Ivanov), 12.1–189.

12.1–1 551.551:551.511.6(08)

*†Taylor, Sir Geoffrey Ingram, **Scientific papers, Vol. 2, Meteorology, oceanography anp turbulent flow.** Ed. by G. K. Batchelor. Cambridge, Univ. Press, **1960.** 515 p. figs., tables, refs., eqs. **DLC**—In this second of a series of substantial volumes containing all of the scientific (as opposed to purely expository) works of G. I. Taylor, 45 published and unpublished papers on turbulence, and applications thereof to meteorology, hydrology and oceanography, are collected together and arranged in chronological order (1915–1958). Vol. I was on **Mechanics of solids** and Vol. II, III and IV is or will be on **Mechanics of fluids.** The range of applications is quite impressive: eddy motion in the atmosphere (1915), skin friction of wind at the ground (1916), sound dissipation in the atmosphere (1916), wind variations at ground (1916), formation of fog and mist (1917), tidal friction in estuaries and basins (1919–21), tidal friction and the moon (1920), turbulence in pipes (1929), transport of vorticity and heat through turbulent fluids (1932), semi-diurnal atmosphere-tides (1929–36), statistical theory of turbulence (1935–6), isotropic turbulence (1937), turbulence spectrum (1938) and flow induced by jets (1958). Several of these papers were written for the Advisory Committee for Aeronautics in World War I or the Aeronautical Research Committee after the war. Most of them, however, were fundamental papers printed in the *Royal Society Proceedings* (25), 1 in *Philosophical Transactions*; 1 in *Royal Met. Soc., Quarterly Journal* and one in their *Reports and Memoirs*; 3 in *Cambridge Philosophical Society, Proceedings*; 2 in *London Math. Soc., Proceedings* and 1 each in *Royal Astronomical Society, Monthly Notices*, and a few in foreign journals (*Conseil Int. pour l'Exploration de la Mer, Rapports*, etc.; *Zeit für Angewandte Math. und Phys.*) and in the *Journal of Aeronautical Sciences* and *Aero/Space Sciences.* Papers have been carefully edited and corrected when necessary, illustrations redrafted, etc. The chronoogical arrangement of the works presents a clear perspective of the development of his magnificent statistical theory of turbulence beginning with his analysis of the aerological data obtained by kites off the Grand Banks during August 1913 (*see* 4B–14) and reaching its climax n the applications during the last 25 years to studies of turbulent exchange and diffusion. All of the papers are mathematical, yet all have clearly defined applications in mind, which, however, does not detract from their applicability in other fields. Over a dozen of these papers have been abstracted in *Met. Abstracts* (*see* 3F–5; 4A–11, –16, –17, –30, –38, –39, –48; 4B–14, –21). *Subject Headings:* **1. Collected papers of G. I. Taylor 2. Turbulence theory . Statistical theory of turbulence 4. History of turbulence theory. I. Batchelor, G. K.** (*ed.*). —*M.R.*

12.1–2 551.594:061.3

*†Conference on Atmospheric Electricity, 2nd, Portsmouth, New Hampshire, May 20–23, 958, **Recent advances in atmospheric electricity; proceedings of the . . . Conference.** Ed. by L. G. Smith. N. Y., Pergamon Press, **1958.** 631 p. figs., tables, refs., eqs. (For listing f contents, *see* Pt. III, p. 1771, Nov. 1959, *Met. Abstracts.* All articles abstracted separately.) **DWB**—At this international Conference on Atmospheric Electricity, over 100 participants iscussed more than 60 papers in the following fields: fair weather electricity, thunderstorm lectricity, and lightning discharge. *Subject Headings:* **1. Atmospheric electricity conferences. . Smith, L. G.** (*ed.*) **II. Wentworth Institute, Boston, Mass. III. U. S. Air Force, Cambridge Research Center.**—*N.N.*

12.1–3 551.511(08)

*†Akademiia Nauk SSSR. Institut Fiziki Atmosfery, **Raboty po dinamicheskoĭ meteorologii.** [Papers on dynamic meteorology], ed. by I. A. Kibel'. Its *Trudy*, No. 2, **1958.** 186 p. numerous figs., tables, refs., eqs. **DLC**—This volume contains papers on dynamic meteorology completed during the period 1951–1954. All the papers deal with the application of the theoretical dynamic meteorology to weather forecasting and to the theory of climate. (For listing of contents, *see* Pt. III, p. 1432, Sept. 1959, *Met. Abstracts.* These articles abstracted separately.) *Subject Headings:* **1. Dynamic meteorology. I. Kibel', I. A.** (*ed.*).—*I.L.D.*

12.1–4 551.582.1(08)

*†Leningrad. Universitet, **Klimatologiia.** [Climatology.] Its *Uchenye Zapiski*, No. 269, **1959.** 184 p. figs., tables, bibliogs., eqs. (*Leningrad. Universitet. Geograficheskiĭ Fakul'tet, Seriia Geograficheskikh Nauk*, No. 13). (For listing of contents of this issue, *see* Pt. III, p. 1436, Sept. 1959, *Met. Abstracts.* These articles abstracted separately.) **DLC**—This is a collection of articles dealing with various climatic elements playing a significant role in determining the climatic characteristics and in particular the agricultural climatology of various regions of the U.S.S.R. The articles are concerned with the history of climatology in the U.S.S.R., radiation regime of slopes, moisture exchange in the forest zone, long period temperature fluctuations, frost intensity and forecasting. Articles are listed in monograph. *Subject Headings:* **1. Climate of U.S.S.R. 2. U.S.S.R.**—*I.L.D.*

A2. TEXTBOOKS

12.1–5 551.5:629.13(02)

§†George, Joseph J. (*Eastern Air Lines, Atlanta, Ga.*), **Weather forecasting for aeronautics.** With contributions by R. J. Shafer; P. W. Funke; W. R. Biggers; H. B. Visscher; R. M. Whiting; R. E. Bailey and A. H. Stakely. N. Y., Academic Press, **1960.** 673 p. figs., tables, 114 refs. **DLC**—Most textbooks on aeronautical meteorology have only a chapter or two devoted to practical forecasting, being oriented more toward an orderly presentation of classical meteorology with emphasis on those elements important in aviation. This new and handy text begins where the others leave off, being devoted entirely to the results of >20 years of study by the author, his colleagues and others. The text aims at devising objective rules or aids for forecasting weather at terminals and along airways, not only in the eastern U. S., but all over the world. The aids thus devised are set forth and discussed and illustrated by means of maps, charts, scatter diagrams, tables, prediction nomograms, etc., and each chapter has a detailed check-list for use by the forecaster in successfully analyzing and evaluating the various parameters in order to come up with the best possible forecast based on the techniques and aids presented. Many of these aids are taken from "report literature" not widely circulated but most of them are original. Appended are charts of monthly mean sea surface temperature for waters adjacent to the east and west coasts of the U. S., and a good bibliography and subject index. The book is substantial and nicely bound and edited. The first two chapters give brief summaries of the general problem of forecasting and the methods used in analysis and construction of prognostic pressure charts. Successive chapters deal with forecasting or prediction of: 3) cyclogenesis in the eastern U. S., over the oceans, and over the west coasts of Europe and the U. S.; 4) movement, deepening and filling of cyclones; 5) movement of anticyclones over North America; 6) movement of 500 mb cold lows and their effect on surface lows; 7) displacement of surface cold fronts; 8) warm frontal analysis and movement; 9) tropical cyclone movement; 10) graphical numerical weather prediction; 11) synthesis of a progress chart (example); 12) low ceiling and fog; 13) pre-trough winter precipitation; 14) severe weather (thunderstorms, line-squalls, turbulence, maximum gusts, tornadoes, hail, icing); 15) heavy snowstorm; 16) wind and temperature for aeronautical purposes; 17) use of radar in forecasting; 18) local forecast studies for airports at: Atlanta, Birmingham, Chicago, Cleveland, Detroit, Houston, Indianapolis, Jacksonville, Mobile, Nashville, New Orleans, New York, St. Louis and Tallahassee. These last studies are quite comprehensive and are done in the style for which the author has been famous during the last quarter of century in airlines, World War II U. S. A. F. operations throughout the world and, to some extent, in the U. S. W. B. Ch. 10 and 11 were prepared by R. J. SHAFER, Ch. 13 by P. W. FUNKE, Ch. 15 by R. E. Bailey and 16 by H. B. Visscher. These chapters are abstracted separately. Full credit is given throughout the book to others who have made substantial contributions, and minor contributions are cited in the bibliography. Actually, this is the first practical textbook or handbook on forecasting the many weather elements in the U. S. which has appeared since Bowie, Weightman and others published a similar compilation back in 1914. The earlier work, however, did not have the advantage of half a century of progress in refinement of statistical, climatological and objective tools, nor in the wealth of detailed surface and upper air, radar and other data which could be used for formulating and testing rules—for making much more precise and detailed forecasts throughout the troposphere, however, rather than merely for surface forecasts. *Subject Headings:* **1. Aeronautical meteorology forecasting textbooks 2. Objective forecast aids.**—*M.R.*

12.1–6 551.5:797.55(02)

§Georgii, Walter, **Meteorologische Navigation des Segelfluges.** [Meteorological navigation for gliders.] Brunswick, F. Vieweg, **1959.** 135 p. 74 figs. **DLC** (TL765.G46)—The book is divided into two sections. The first deals with the atmospheric sources of power available for gliders. The second discusses the weather conditions for power gliders. Synoptic maps of favorable and unfavorable weather conditions (such as thermals, warm fronts, cold fronts, thunderstorms, cumulus clouds, diurnal and seasonal factors and orographic conditions) for glider flights are included. *Subject Heading:* **1. Gliding meteorology textbooks.**—*E.Z.S.*

12.1–7 551.588.7(02)

*†Różański, Stanisław, **Budowa miasta a jego klimat.** [Buildings of a city and its climate.] Warsaw, Arkady, **1959.** 322 p. 215 figs., 32 tables, 468 refs. **DWB** (M88.7 R89bu)—An up-to-date textbook on urban climatology summarizing the information contained in nearly 500 works on general, macro-, meso- and micro-climatology, especially as applied to the effect of cities, towns, buildings, trees, factories, streets, pollution, cloudiness, topography, etc., on the inhabitants. Physiological effects, psychological effects, resort climatology, effect of shade and similar topics are predominant in the treatment. Many original sketches and many taken from similar texts (e.g., Kratzer, Aronin, Geiger) are included. *Subject Headings:* **1. Urban climatology textbooks 2. Bibliography of urban climates 3. Urban influences.**—*M.R.*

12.1–8 551.58:551.4(02)

†*Gentilli, J., **A geography of climate.** 2d ed. rev. Perth, Univ. of Western Australia Press, **1958.** 172 p. 28 figs., 46 maps, tables, bibliog. p. 167–170. (For abstract on first ed., 1952, *see* 4.2–226, Feb., 1953, *Met. Abstracts.*) **DWB** (M81 G338g)—This second edition of Gentilli's small textbook on climatology from a meteorological and a geographic point of view, has been increased in size from 107 to 172 pages of about 65% with a corresponding increase in the number of illustrations, maps, tables, etc. The subtitle—**Synoptic world pattern**—emphasizes the importance of the global perspective of climate as illustrated both graphically and statistically. The various climatic elements (radiation, atmosphere, temperature, land-sea breezes, monsoons, hurricanes, evaporation, condensation, thunderstorms, hail, season and climatic classification systems) are treated in separate chapters and systematized. Tropical climatology and meteorology are given ample consideration. The extensive bibliography of general sources is valid through 1958. Considerable useful data of specialized character are incorporated. *Subject Headings:* **1. Geographical climatology textbooks 2. Global climate.**—*M.R.*

12.1–9 551.509.59:63(02)

*†Ulanova, Evgeniia Stanislavovna, **Metody agrometeorologicheskikh prognozov.** [Methods of agrometeorological forecasts.] Leningrad, Gidrometeoizdat, **1959.** 280 p. 74 figs., 77 tables, 122 refs. **DWB** (M:63 U36me), **DLC** (5600 U45)—A complete exposition of development and methods of agrometeorological assessment and forecasting, especially as carried on by the Hydrometeorological Service of the U.S.S.R. The main crops discussed are: winter and spring wheat, rye, barley, oats, maize, hay and other grain crops and potatoes. Forecasts are made of favorable dates for beginning field work, for sowing, cultivating and harvesting

and various phenological processes and operations. Statistical methods of evaluation of success of techniques and other empirical tools are described and amply illustrated. Data from various regions of the U.S.S.R. are cited. All except 9 of the 122 references cited are to Russian works in agrometeorology. All of the important weather elements are considered in the analysis and forecasting. *Subject Headings:* **1. Agrometeorological forecasting textbooks 2. U.S.S.R.**—*M.R.*

12.1–10 551.579:551(02)

†Fourmarier, Paul, **Hydrogéologie: introduction à l'étude des eaux destinées à l'alimentation humaine et à l'industrie.** [Hydrogeology: an introduction to the study of water destined for human consumption and for industry.] 2d ed. rev. & enl. Paris, Masson; Liège, Vaillant-Carmanne, **1958.** 294 p. 164 figs., refs. Price: 3000 FF. (First ed. 1939.) **DLC** (GB661.F1 1958)—An introductory text with abundant idealized sketches illustrating basic principles of hydrogeology. Major emphasis is placed upon quality of water sources of chemical, inorganic and organic constituents, modern principles and procedures of purification of water for human and industrial use. References to meteorology occur in relation to the study of hydrogeology in arid and semi-arid lands; in relation to intensity and duration of precipitation and its effect on various rock types. An annual pluviosity map of Belgium (1901–1930) is given. Tables give the coefficient of rainfall of some of the major rivers of the world: Rhine, Amazon, Mississippi, Indus, etc. The coefficient of permeability is given for several rock types. Some simplified hydrological and chemical formulas are given. *Subject Heading:* **1. Hydrogeology textbooks.**—*E.Z.S.*

12.1–11 551.**573**:551.**574.41**(02)

†Fuks, N. A., **Evaporation and droplet growth in gaseous media.** Transl. from the Russian by J. M. Pratt. Ed. by R. S. Bradley. N. Y., Pergamon Press, **1959.** 72 p. 18 figs., 88 refs., eqs. **DLC, DWB** (536.44 F961ev). Transl. of original Russian **Isparenie i rost kapel' v gasoobrasnoi srede,** issued as *Akademiia Nauk SSSR, Itogi Nauki, Fiziko-Matematicheskie Nauki,* No. 1, **1958.** 89 p. 18 figs., etc. (For abstract on original Russian, *see* 10.10–30, Oct. 1959, *Met. Abstracts.*)—Evaporation of droplets in a gaseous medium; droplet growth as in clouds or fog and evaporation drop falling, as in falling cloud or rain particles, are treated theoretically in this book. Other forms mentioned are condensation during atomic explosions, from jet plane exhausts, on gaseous ions, etc., and adsorption of gases on solid or liquid aerosol particles. The book is confined to evaporation of drops of pure liquid (not solutions) and the thermodynamics, including vapor pressure of droplets. The three major chapters cover: I. Quasi-stationary evaporation and growth of droplets which are motionless with respect to medium (Maxwell equation, Stefan flow, nonspherical drop evaporation, fall in temperature of freely evaporating drops and of supported evaporating droplets—theory and experiments). II. Quasi-stationary evaporation and growth of droplets moving in relation to the medium (theory and experiments with freely falling droplets). III. Nonstationary evaporation and growth of droplets motionless with respect to the medium, and of moving drops, etc. The book constitutes an orderly survey of the literature from many countries as shown in the extensive bibliography. A subject index is appended. *Subject Headings:* **1. Evaporation of droplets 2. Droplet evaporation textbooks.**—*M.R.*

A3. MONOGRAPHS

See also: **Solar spectrum** (ten Bruggencate et al.), 12.1–109; **Dynamic soil analysis** (Bornmann), 12.1–170; **Hydraulic research** (Middleton, *ed.*), 12.1–197.

12.1–12 551.**586**:599.33:551.**582.1**(584.5)

*†Chernyshev, V. I., **Akklimatizatsiia nutrii v Tadzhikistane.** [Acclimatization of the nutria in Tadzhikistan.] *Akademiia Nauk Tadzhikskoĭ SSR. Institut Zoologii i Parazitologii,* Trudy, Vol. 56, **1959.** 63 p. 7 figs., 24 tables, 29 refs. **DWB** (M86:59 C521ak)—In a monograph describing field studies during 1946–1953 in the lake region of S. Tadzhikistan, aimed at acclimatizing the nutria or coypu, a fur-bearing aquatic rodent whose habits are similar to the beaver, the author presents a great deal of data on water (river, pond and lake)

temperatures and also maximum and minimum air and soil temperature in this area. The author also discusses the climate and weather during the above mentioned years in the lower Vakhsh River basin, and its relation to the acclimatization of the nutria. The author continued the work on the "nutria farm" in 1953–57, but has not included the recent data in this study. *Subject Headings:* **1. Acclimatization of nutria 2. Climate of southern Tadzhik S.S.R. 3. Water temperatures, Tadzhik S.S.R. 4. Vakhsh Basin, Tadzhik S.S.R.**—*M.R.*

12.1–13 551.582.1(495)
Iliopoulos, P. J. (*Univ. of Athens: Univ. of Paris*), **Le climat de la région égéenne de la Grèce.** [Climate of the Aegean region of Greece.] Athens, **1952.** 75 p. figs., 20 tables, 44 refs., foot-refs. (**Collection de l'Institut Français d'Athènes, Vol. 75**). **DLC** (QC989.G9714) —A study on the usual climatic elements of the maritime parts of Greece, based on 1900–1929 data from 24 stations in the Aegean region as far south as Crete (35°N) and north to Thessaloniki (40°41′N). Tables and graphs give average and extreme pressure, air and sea temperature, rainfall, frost, evaporation, humidity (relative and absolute), cloudiness, sunshine, wind, snow, dew, thunderstorms, weather types, climatic changes, etc. *Subject Headings:* **1. Climate of Greece 2. Greece.**—*M.R.*

A4. MANUALS

See also: **Airport forecasting manual, Nellis AFB, Nevada** (Anderson), 12.1–261.

12.1–14 551.586:551.326.7:612.014.4
Canada. Meteorological Branch, **Manice: manual of standard procedures and practices for ice reconnaissance.** 2d provisional ed., effective March 1, **1959.** Its *CIR*-3188, ICE-3, April 23, **1959.** 49 p. figs., tables. **DWB** —This manual discusses life and activities in a predominantly ice-covered area and gives suggestions for overcoming difficult living conditions in such an area. It gives a summary of the observations of sea ice forms, their concentrations and character and the influence these and other meteorological factors have on the work of a forecaster. The results obtained so far have been satisfactory. The manual has included all the suitable techniques that have been used in observing and reporting ice conditions and is useful for aircraft and ships. *Subject Headings:* **1. Bioclimatology 2. Ice reconnaissance.** —*N.N.*

12.1–15 5(02)
†Condon, E. U. and Odishaw, Hugh (*eds.*), **Handbook of physics.** N. Y., McGraw-Hill, **1958.** Each section repaged (about 1500 p.). figs., tables, eqs. Bibliog. at end of each ch. Price: $25.00. **DWB** (530 C746ha), **DLC** (QC21.C7). Review (and outline by divisions, chapter headings and authors) by Wallace R. Brode in *Optical Society of America, Journal*, 49(1):103–106, Jan. **1959.** Review by Homer E. Newell, Jr. in *Science*, Wash., D. C., 130(3366):31, July 3, **1959.** Review by H. Lipson and S. G. Lipson in *Nature*, London, 184(4683):298–299, Aug. 1, **1959.**—This substantial contribution by 90 authors covers the field of physics in a thorough analytical manner. The volume is divided into 9 parts as follows: 1) Mathematics, 2) Mechanics of particle and rigid bodies, 3) Mechanics of deformable bodies, 4) Electricity and magnetism, 5) Heat and thermodynamics, 6) Optics, 7) Atomic physics, 8) The solid state and 9) Nuclear physics. Each part consists of several chapters; each contributed by an individual author or authors. The following chapters have been abstracted separately: Taub, A. H.: **Wave propagation in fluids** (*see* 10G–122, July 1959, *Met. Abstracts*), Ingard, Und: **Acoustics** (10G–118), Wilson, R. W. and Arnold, R. D.: **Thermometry and pyrometry,** and Peters, B.: **Cosmic rays** (11.8–81). *Subject Headings:* **1. Physics handbooks 2. Acoustics 3. Cosmic radiation 4. Wave propagation.**—*G.T.*

12.1–16 551.5:629.135(02)
U. S. Office of Naval Operations, **All-weather flight manual.** Reproduced by Federal Aviation Agency, Bureau of Flight Standards. Its NAVAER 00-80t-60, **1957.** 32 ch. separately paged. numerous figs. Ch. 11, **Publications. DWB** (M:629.13 U585aL), **DLC** — A detailed and elaborately illustrated manual covering: I) basic instruments, II) all weather

flight operations, and III) aerology as affecting all weather flying. In Pt. II flight planning, control, GCA and ILS systems, air-borne weather radar, night vision and all weather flying from aircraft carriers are discussed; in Pt. IV weather data used for flight planning, frontal weather, fog, icing, thunderstorms, pressure pattern and single heading flight, and world weather and climate are discussed with many illustrations and schematic diagrams. Each of the above sections has numerous subsections. *Subject Headings:* **1. All weather flight manuals 2. Aviation meteorology manuals.**—*M.R.*

A5. NEW SERIALS

12.1–17 550.3(05)

[Akademiia Nauk SSSR], **Bulletin of the Academy of Sciences of the U.S.S.R., Geophysics Series,** No. 1, 1957, issued **1958.** Latest issue seen No. 10, Oct. 1960, issued March **1961.** This is an English language edition of the **Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia,** and is issued by the American Geophysical Union with the aid of a grant from the National Science Foundation. Early issues printed by Pergamon Press. Monthly. Translation editor, W. S. Jardetzky (Werner A. Baum was translation editor of earlier issues). Price, per volume of 12 numbers, 1959 $25.00, from A. G. U., 1515 Massachusetts Avenue, N. W., Wash., 5, D. C. Price back issues varies. All available from A. G. U. Note: paging of No. 2, 1957 was to be rectified to make paging continuous through each volume. **DWB**—The **Izvestiia, Ser. Geofiz.** is a continuation with new numbering of the Geophysics section of the former **Izvestiia, Ser. Geograficheskaia i Geofizicheskaia,** beginning with No. 1, 1951 (i.e. Vol. 15, No. 1 of the former series). Present editor of the **Ser. Geofiz.** is A. G. KALASHNIKOV. (For abstract on the original Russian journal, see Vol. 1.1–1, Jan. 1950, *Met. Abstracts.*) English language edition is now issued with about a 6 months' lag. *Subject Headings:* **1. Serial publications 2. Geophysical serials. I. American Geophysical Union II. Pergamon Institute, N. Y. III. Jardetzky, W. S.** (*ed.*).—*D.G.*

12.1–18 019.941:519.2(05)

†**International Journal of Abstracts: Statistical Theory and Method,** Vol. 1, No. 1, issued July, **1959.** Latest issue seen, 1(2), **1959.** Published by Oliver and Boyd, Edinburgh, for the International Statistical Institute. Quarterly. Price, annual, $16.00, from Oliver and Boyd, Tweeddale Court, 14 High Street, Edinburgh. Editor, Wm. R. Buckland. 1(1), abstracts 1–160; 1(2), abstracts 161–326. Arranged in 12 subject groups, 2 abstracts per unnumbered leaf, suitable for cutting and arranging in files. **DWB, DLC.**—A list of about 350 journals regularly covered is appended at the beginning of the bulletin. The separate sections are on different colors of paper. The 12 major groups are: 0) mathematical methods (white), 1) probability (pink), 2) frequent distribution (green), 3) sampling distribution (light blue), 4) estimation (yellow), 5) testing (purple), 6) relationships (grey), 7) analysis of variance (biscuit), 8) sampling design (orange), 9) experiment design (blue), 10) stochastic theory and time series analysis (red), 11) miscellaneous (cream). Under each section there are 10 subsections. The abstracts are occasionally long and critical, with about 160 to an issue, No. 2 of Vol. 1 contains an author index for Nos. 1 and 2. About $\frac{2}{3}$ of the issue (i.e. volume) is wasted in blank space in order to allow for cutting. *Subject Headings:* **1. Statistical abstracts 2. Abstracting periodicals. I. Buckland, W. R.** (*ed.*) **II. International Statistical Institute, Netherlands.**—*M.R.*

12.1–19 550.3(05)

*†**Problemy Severa,** No. 1, issued Moscow, Akademiia Nauk SSSR, **1958.** Latest issue seen No. 3, **1959.** No. 1, 370 p. No. 2, 265 p. figs., tables, bibliogs., eqs. (For listing of pertinent articles of No. 1–2, *see* Pt. III, p. 1440, Sept. 1959, *Met. Abstracts.* These articles abstracted separately.) **DLC**—This new and substantial serial is devoted to geophysical, oceanographic, meteorological, geological, geographic, biological, and economic and future problems of the Arctic and Antarctic and is similar in scope to **Problemy Arktiki,** but covers more comprehensive investigations. The first issue (1958) comprises 32 articles (nearly 400 pages) of which 4 are on **Oceanology** (ice drift, formation of ice, effect of rivers on Arctic Ocean currents), 4 on **Geophysics** (aurora, climatology, geomagnetism and ice ablation), and 2 on the

Antarctic (ice and water masses). Moreover 6 articles in some of the above mentioned general fields deal with future lines of research in the Arctic. The articles contain a large quantity of cartographic and diagrammatic illustrative material, some tabular data, theory and good bibliographies. The second issue (#2, 1958) contains 30 articles (about 250 pages), 4 of which are on oceanography, ice, etc. *Subject Headings:* **1. Serial publications 2. Arctic research journals 3. Arctic 4. Antarctic. I. Akademiia Nauk SSSR. Komissia po Problemam Severa Soveta po Izuchenii Izucheniiu Proizvoditel'nykh Sil.**—*M.R.*

A6. IGY—ARCTIC—ANTARCTIC

See also: **Arctic and Antarctic serial publication,** 12.1–19; **Ionos. research** (Waldmeier), 12.1–107; **IGY geomag. program** (Kertz), 12.1–145; **Sub-ice positioning, Arctic** (Thomas), 12.1–193; **Ice formations, Antarctica** (Vtiurin), 12.1–195; **Ozone concentration, Adélie Land** (Vassy, Rouhani), 12.1–276; **Warming of Arctic** (Lange), 12.1–318; **Climate, Heard Island** (Doyen), 12.1-399; **IGY glaciology program** (Roberts), 12.1–420, 12.1–421.

12.1–20 551.5:550.3:551.506.22

†Cheng, Kenneth T. C., **A summarized review on the contributions in International Geophysical Year.** *Meteorological Bulletin,* Taipei, Formosa, China, 5(1):1–10, 1959. 2 tables, 39 refs. In Chinese; English summary p. 1. **DLC**—This address was given to the Annual Youth Conference in science at Chiayi on Feb. 17, 1959. A summarized review of about fifty papers, for which the writer has been cited, is given. He first gives a short historical sketch of IGY and then discusses briefly the definition of geophysics and the sphere of geophysical observations. Programmes on World Days, Data Centre, networks of stations on observation of different geophysical phenomena and communication systems are very briefly reviewed. Contributions in IGY are discussed under the following topics: (a) Antarctic program and its contributions, (b) Arctic explorations, (c) Atmospheric physics of high levels, (d) Sphere probe and rockets or satellites findings, (e) Heat balance study and water control hypothesis, (f) Some investigations on the researches of structure and core of the earth and some seismological and gravimeter measurements and (g) Conclusion. *Subject Heading:* **1. International Geophysical Year, 1957/1958.**—*From author's abstract.* Ⓢ

12.1–21 550.3:551.506.22

Veldkamp, J., **Nieuws van het Geofisische Jaar, deel IX.** [News of the Geophysical Year, Pt. 9.] *Hemel en Dampkring,* The Hague, 57(9):217–220, Sept. **1959.** 3 photos. **DWB, DLC**—A brief description is given of the activities of the geophysical stations set up by the Netherlands at Paramaribo (Surinam) and Hollandia (New Guinea) as part of the program of the IGY. Both the stations are especially designed for continuous recording of terrestrial magnetism, regular ionospheric soundings and recording of solar radiation at different frequencies. The second part of the article is a brief report of the plans of several countries which are continuing the geophysical research after the end of the IGY. *Subject Heading:* **1. Netherlands participation in IGY.**—*A.V.*

12.1–22 551.501.9(99)

Flowers, Edwin C. (*USWB*), **Weather at US-IGY Antarctic stations during 1957.** *American Geophysical Union, Transactions,* 39(5):997-1001, Oct. **1958.** fig., 2 tables. **DWB, DLC**—A list of all the U. S. IGY stations in the Antarctic is given. Complete operation was carried on in 1957 at IGY Little America, Byrd, Amundsen-Scott, Ellsworth, Wilkes, Hallett and NAF McMurdo stations. *Subject Headings:* **1. U. S. participation in IGY 2. Antarctic International Geophysical Year operations.**—*N.N.*

12.1–23 91.04(09)(99)

†Mitterling, Philip I., **America in the Antarctic to 1840.** Urbana, University of Illinois Press, **1959.** 201 p. figs., numerous foot-refs. **DLC** (G870.M67). Review by Philip M. Smith in *Science,* 131(3406):1037, April 8, **1960.**—A popular historical account of knowledge of

and explorations in the Antarctic before 1800, and from 1800–1840 (sealers, PALMER, REYNOLDS, WILKES, ROSS and WEDDELL). Many sources are listed and commented on (histories, manuscripts, printed journals, government documents, letters, diaries, speeches, newspaper articles, biographies, reviews etc.). A good index is provided. Special attention is paid to the role of the U. S. Government (Navy, etc.) in Antarctic exploration during this period. *Subject Headings:* **1. Antarctic exploration** (–**1840**) **2. U. S. exploration in Antarctic.**—*M.R.*

12.1–24 551.506.1:551.582.2(99)

*Murakoshi, Nozomi, **Meteorological observations at the Syowa Base during March 1957–Feb. 1958.** *Antarctic Record,* Tokyo, No. 4:1–22, July **1958.** 10 figs., 4 photos, 21 tables. In Japanese; English summary, p. 1–3. **DWB**—The meteorological observations at Syowa Base were made during the period of March 1, 1957 to Feb. 10, 1958. However, for lack of equipment the author was unable to get complete results. The instruments used, data on temperature, blizzards, humidity, snow, cloud and other weather phenomena are given in the report. *Subject Headings:* **1. Meteorological observations 2. Climate of Syowa Base 3. Syowa Base, Antarctica.**—*N.N.*

12.1–25 656.61(02)(99:42) 551.582.2(99:42)

Argentina. Servicio de Hidrografia Naval, **Derrotero Argentino, Pt. V, Antartida y Archipielagos Subantarticos Argentinos.** Issued Buenos Aires, **1958.** 2 vol. (366 and 242 p.) numerous figs., and photos (many fold.), tables. looseleaf. [Pub.] *II.* 205. **DWB** (M82/82 A691de). Also their: **Suplemento No. 1, 1958** (brought up to Dec. 1, 1958, including Folleto 23/958), issued **1958. DWB**—The first 5 chapters comprise a general graphic and technical description of the Argentine Antarctic and sub-Antarctic islands, a history of explorations, a chronological list of voyages, geology, and glossary of terms (flora, fauna, etc.). Ch. VI covers the climate and weather of the Antarctic with simple illustrative synoptic charts and Ch. VII has the title: **Optical phenomena.** Ch. VIII gives a summary of oceanographic conditions, tides and currents. Ch. IX discusses the glaciological conditions on the continent and at sea, ice formation and movement at sea. In the meteorological section visibility, fog, clouds, air temperature (mean charts for year and for January–February), etc. are discussed and illustrated for the region from Patagonia to Tierra San Martin. Similar charts and discussion are given for ocean currents, temperatures and sea ice. Excellent photographic plates of ice formation on land and sea are included in the glaciology section and hundreds of such photographs are appended in Sec. 2. In Vol. 2 there are a number of local climatic tables of the standard form based on data for 1947–55 or shorter periods included in the regional discussions, (Destacamento Naval Almirante Brown, 64°58′S, 62°53′W; Puerto Lockroy 64°49′S, 63°29′W; Decepcion 62°59′S, 60°43′W; Melchoir 64°20′S, 62°59′W; Teniente Camara 62°37′S, 59°57′W; Islas Argentina 65°16′S, 64°16′W; Esperanza 63°24′S, 57°01′W; Isle Cerro Nevdo 64°20′S, 57°00′W) and brief summaries of climatic conditions. *Subject Headings:* **1. Coastal pilot handbooks 2. Climatic data for Argentine Antarctic 3. Antarctic glaciology 4. Antarctic oceanography 5. Antarctic ice 6. Argentine Antarctic.**—*M R.*

12.1–26 551.578.46:551.552.8:551.521.32:551.524.4(99)

Liljequist, G. H. (*Univ. of Stockholm, Sweden*), **Long-wave radiation and turbulent heat transfer in the Antarctic winter and the development of surface inversions.** (In: Polar Atmosphere Symposium, Oslo, July 2–8, 1956, **Proceedings, Pt. 1, Meteorology Section.** N. Y., Pergamon Press, **1958.** p. 167–181. 15 figs., 7 refs.) Also issued in *Journal of Atmospheric and Terrestrial Physics,* London, Special Supplement, Pt. 1, **1957.** p. 167-181. **DWB, DLC**—The subject was studied at Maudheim under a variety of meteorological conditions and demonstrated marked differences in physical properties of the snow below and above 0°C. Surface inversions in winter usually occurred under a clear sky, light to moderate wind and with a temperature difference of 10–20°C between the top and the foot of the 10 m tall instrument mast used. The magnitude of these inversions affecting the net long wave radiation Es from the surface, was concentrated on an average of 40–45% to the lowest 10 m above ground. The heat transfer and the heat conduction are computed. Test of the relationship between a mean wind speed at 10 m and the turbulent heat transfer Q is shown as a straight line with the points from measurements of Es, the long wave radiation and σ, the heat conduction pretty well aligned. The energy fluxes to be considered are then shown to be

$$\begin{array}{r} Q=0.030\ \text{ly/min} \\ \sigma=0.020\ \text{ly/min} \\ \hline \text{Es}=0.050\ \text{ly/min} \end{array}$$

It is thus concluded that the development of marked polar surface inversions is mainly due to the low heat conduction of the snow. *Subject Headings:* **1. Surface inversions 2. Turbulent transfer of heat 3. Snow cover radiation 4. Maudheim, Antarctica.** *—W.N.*

A7. CONFERENCES-SYMPOSIA

See also: **Atmos. elec. conf.,** 12.1–2; **Ice movement symposia,** 12.1–217.

12.1–27 551.586:633.51:061.3 551.579:061.3(584.4)

Logvinov, K. T., **Soveshchanie po gidrometeorologicheskomu i agrometeorologicheskomu obsluzhivaniiu khlopkovodstva.** [Conference on the Hydrometeorological and Agrometeorological Service for cotton growers.] *Meteorologiia i Gidrologiia,* Leningrad, No. 11:67–68, **1958. DWB, DLC** –This conference was held in Tashkent during June 18–20, 1958. The conference, which was attended by representatives from the Principal Hydrometeorological Service, The Central Institute of Forecasting, local weather services (Uzbek, Tadzhik, Turkman, Kazakh S.S.R.), etc., stressed the need for expanding weather services in the cotton raising areas, improving meteorological and hydrological forecasts, expanding hydrometeorological and agrometeorological knowledge among the farmers, making the Central Asian Hydrometeorological Research Institute into a center for studying cotton cultivation problems, etc. *Subject Headings:* **1. Hydrologic conferences 2. Agrometeorological conferences 3. Cotton weather services 4. Tashkent, Uzbek S.S.R.**—*I.L.D.*

A8. SERVICES-OBSERVATORIES

See also: **Aeronaut. met services,** 12.1–43; **Peruvian Met. Service** (Roldan Seminario), 12.1–106; **Solar observatories** (Mitropol'shaia), 12.1–122; **Hydrologic services, U.S.S.R.** (Zolotukhin), 12.1–198.

12.1–28 551.5:061.1(47)(09)

Adamov, Pavel Nikolaevich, **Sluzhba pogody.** [Weather service]. Leningrad, Gidrometeoizdat, **1954.** 39 p. 13 figs. **DLC** (QC989.R49A2). 2d ed., issued **1959.** 43 p. 13 figs. **DWB** (M(06) A199sL)—A popular booklet describing the organization of the Weather Service in the USSR. Information on the organization of meteorological stations and the work carried out, on the volume of observations and methods of processing in Weather Bureaus, Hydrometeorological bureaus and aviation weather stations, as well as of the routine work in Weather Bureaus is preceded by a historical review of the origin and development of the Weather Service (since 1725) in Russia. Only slight changes and additions have been made in the second edition to bring it up to date. *Subject Headings:* **1. U.S.S.R. weather services 2. History of Soviet meteorological services 3. U.S.S.R.**

12.1–29 551.501.9:378.4(572)

Askhaev, M. G. and Egorov, A. G., **K istorii nauchnoĭ stantsii Irkutskogo universiteta na Baĭkale.** [The history of the Irkutsk University scientific station at Lake Baikal.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 91(3):299–300, May/June **1959. DLC**—The idea of a scientific station on Lake Baikal was proposed first by members of the Eastern Siberian Branch of the Russian Geographical Society at the end of the nineteenth century. In 1897 V. P. Popov and V. B. Shostakovich prepared to organize such a station on the western shore of Lake Baikal 60 km north of the source of the Angara River. At this station climatological, hydrological, hydrochemical and biological investigations were carried out. This station, which was established by private means, soon closed down. In 1916 the Academy of Sciences undertook a systematic investigation of Lake Baikal but a scientific station was not organized until 1919 on the western shore at Bolshie Koty, 25 km south of the source of the Angara River. In 1921 it was transferred to Irkutsk State University and in 1926 the station came under the administration of the Biological Geographical Scientific Institute of the University. The various investigations associated with the research work done at this station and the type of research carried out form the subject matter of some of the published monographs. In addition the scope of present research is mentioned. *Subject Headings:* **1. Meteorological research stations 2. Universities 3. Lake Baikal, Siberia.**—*I.L.D.*

12.1–30 551.506.8:061.2(47)

Ot fenologicheskogo sektora Geograficheskogo obshchestva Soiuza SSR. [Notice from the phenological section of the U.S.S.R. Geographical Society.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 90(2):201–202, March/April **1958. DLC**—Since the World War II the voluntary phenological network has been operating under the auspices of the Geographical Society of the U.S.S.R. In recent years the phenological section has worked up the material for 1954–1958. The number of voluntary members exceeds 450. A list of 67 observers whose reports are outstanding in accuracy and regularity is given. *Subject Headings:* **1. Phenological services 2. U.S.S.R.**—*I.L.D.*

12.1–31 551.5:061.1(729.7/8) 551.582.3:551.577.21(729.7/8)

Perrusset, Marcel, **Antilles et Guyane. 3-Météorologie.** [Antilles and Guiana, 3 Meteorology.] *France. Secrétariat Général à l'Aviation Civile, Revue,* No. 103:24–35, Jan. 15, **1960.** 7 figs.—After giving a short historical account of meteorology, the author describes the organization and composition of the meteorological service in the Antilles-Guiana group. It was constructed by the central service and installed at Fort-de-France (Martinique), the meteorological sub-region of Guadeloupe and the meteorological sub-region of Guiana and Inini. The meteorological transmissions are ordinarily received by radio. However, the meteorological bulletins of foreign nets are secured either by radio listening or by reception on teleprinter. The principal tasks of the forecasting service are: protection against cyclones; meteorological assistance to air navigation; meteorological assistance to sea navigation and meteorological information for the public. The climatological service consists of about 200 observation stations; some of which have a long series of observations. Schematic climatological charts are reproduced and indicate the annual height of rains in Martinique, Guadeloupe and Guiana. *Subject Headings:* **1. Meteorological services 2. Annual precipitation charts 3. Antilles 4. Martinique 5. French Guiana.**—*A.V.*

12.1–32 551.5:629.13:061.1(494)

Schneider, R., **Le service météorologique suisse de l'aviation au moment de la mise en exploitation des avions commerciaux à réaction.** [The Swiss Air Weather Service at the time when commercial jet airplanes are put into service.] *Schweizer Aero-Revue,* Zurich, 35(5):275–277, May **1960.** 5 figs. **DLC**—The introduction of jet-propelled aircraft on the Switzerland-United States line required the reorganization of the Swiss air weather service. Since the knowledge of the level and intensity of the maximum wind are of utmost importance for jet-planes, the Swiss Meteorological Service draws at the present time forecasting charts at the 300 mb level. These charts show the isohypses representing the general aspect of the atmospheric currents at this level, the isotaches (lines of equal wind speeds) and the altitudes of the tropopause. Maximum wind and tropopause charts are delivered to the operating staffs. Jetstream areas are indicated on these charts and two examples indicate the importance of this factor for jet-planes. An effort has also been made to improve the forecasts of temperature for departure from and arrival at airports. The airports at Cointrin and Kloten are equipped with weather radars and research is done in order to put electronic machines into service for the elaboration of forecasts. The airports also possess transmissometers and a new type of cloud telemeter and the functioning principle of these instruments is briefly explained. As a result of the increasing use of the facsimile method, the respective tasks of the airports at Geneva and Zurich were reorganized. Cointrin Airport prepares forecasts for the Mediterranean area, Africa and the Middle-East; Kloten is specialized for Europe, the Atlantic zone and North America. Each Swiss meteorological center can consequently concentrate its work over a smaller area than in the past and thus elaborate regularly better quality analyses and forecasts. *Subject Headings:* **1. Aeronautical meteorological services 2. Upper air charts 3. Radar observations 4. Swiss Air Weather Service 5. Switzerland.**—*A.V.*

A9. EDUCATION—HISTORY—BIOGRAPHY—BIBLIOGRAPHY

Education

See also: **Teaching of aeronaut. met., 12.1–43.**

12.1–33 551.5:371.33

Goroshnikov, E. A., **Nuzhny khoroshie nagliadnye posobiia.** [Better visual aids are needed.] *Meteorologiia i Gidrologiia*, No. 11:45, Nov. 1956. **DWB, DLC**—The importance of visual aid in the teaching of meteorology, hydrology and oceanography is stressed. The fine maps of the Soviet **World Atlas** and **Marine Atlas** are too small to be used in classroom teaching so that individual institutions have to prepare their own enlargements. It is proposed that the climatic maps, showing the geographical distribution of hydrological elements in volume 2 of the **Marine Atlas**, be issued separately in large size. *Subject Headings:* **1. Visual teaching aids 2. Atlases 3. Teaching of meteorology.**—*I.L.D.*

History

See also: **Hist. of turbulence theory** (Taylor), 12.1–1; **Hist. of Antarctic expeditions** (Mitterling), 12.1–23; **Hist. of Soviet met. services** (Adamov), 12.1–28.

12.1–34 551.583.14(755)

Landsberg, H. E. (*U. S. W. B.*), **Trends in climatology.** *Science*, Wash., D. C., 128(3327): 749–758, Oct. 3, 1958. 7 figs. (incl. photos), 2 tables, 40 refs. **DLC**—An extensively illustrated paper surveying the gradual evolution of climatology from a purely descriptive science to a science that is grounded in physics. The paper is systematically organized. First, a brief historical survey of the general field of climatology is presented, and then progress in major areas of climatology is examined. In separate sections are reviewed areas such as climatic energetics, climatic classification, climatic changes, climatic control, and microclimatology and bioclimatology. The author concludes with speculation on future progress in climatological research. The areas in which new developments can be expected are climate of the upper air, energy and radiation and the borderline field of biology. *Subject Headings:* **1. Climatic trends 2. History of climatology.**—*I.S.*

12.1–35 551.58(47)(09)

Borisov, A. A., **K istorii izucheniia SSSR v klimaticheskom otnoshenii.** [The history of the study of climatology in the U.S.S.R.] *Leningrad. Universitet, Uchenye Zapiski*, No. 269:3–23, 1959. 10 refs., table. **DLC**—The author begins the historical description of the U.S.S.R. with the earliest accounts in the Odyssey. He gives detailed descriptions from the medieval chronicles and the later reports of expeditions in the 16th and 17th centuries. The first report on weather was kept in the secret cabinet of ALEKSEI MIKHAILOVICH; they were made on the order of the guard of the Kremlin. More detailed reports were kept in St. Peterburg from 1722 by VICE ADMIRAL K. KRIUIS on the direct order of PETER THE GREAT and in 1724 the first weather station was established in St. Peterburg. The beginnings of Russian scientific climatology began with M. V. LOMONOSOV in the 1750's. By that time a network of stations was established in Kazan, Tobolsk, Yeniseisk, etc. In 1814 V. N. KARAZIN considered the problem of synchronous analyses and the study of local weather signs and the effect of forest on climate. In 1847 M. F. SPASSKIĬ published **The Climate of Moscow** with its essentially modern conception of climate; it was followed in 1848 by M. S. VESELOVSKIĬ'S **Climate sketch of Russia.** The Central Physical Observatory was established in 1849 and by 1912 the number of meteorological stations had risen to 1209. In 1900 the **Climatological Atlas of Imperial Russia** was published. Despite the predominantly "mean" character of climatology during the 19th century, Russian climatologists attained significant results as indicated by the work of A. I. VOEIKOV. The development of climatology in the 20th century just before the first world war and since the October revolution is summarized. The climatological ideas and researches of L. S. BERG, MULTANOVSKIĬ, KHROMOV, CHUBUKOV, FEDOROV, BUDYKO, etc., various studies on climatology of the U.S.S.R., on the physical and dynamical climatology, etc. are discussed briefly. *Subject Headings:* **1. History of climatology 2. U.S.S.R.** —*I.L.D.*

12.1–36 551.58(477)(09)

Buchinskiĭ, I. E., **Rol' russkikh uchenykh v razvitii klimatologii na Ukraine.** [Role of Russian scientists in the development of climatology in the Ukraine.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy,* No. 5:26–34, **1956.** 49 refs. **DWB, DLC**—This is a historical survey of the preponderate role of Russian scientists in the development of climatology in the Ukraine both before and after the October revolution of 1918. There is nothing unusual in this fact, since 1651 the Ukraine has remained an integral part of Russia. *Subject Headings:* **1. History of climatology 2. Ukrainian S.S.R.**—*A.M.P.*

BIOGRAPHY

12.1–37 551.5:92

[Obituary of] Gerald C. Bristow. *Mariners Weather Log,* Wash., D. C., 3(3):79–80, May **1959. DWB**—BRISTOW died suddenly on Feb. 8, 1959. He was born in Matoon, Ill. on Jan. 12, 1905. His professional career as a climatologist includes 12 reports, several bibliographies and, since 1957, the editorship of the *Mariners Weather Log.* His congenial personality and his professional capabilities are missed by his friends and colleagues. *Subject Headings:* **1. Obituary of Gerald C. Bristow 2. Bristow, Gerald C.**—*W.N.*

12.1–38 51:92 551.5:92

Crombie, A. C., **Descartes.** *Scientific American,* N. Y., 201(4):160–173, Oct. **1959.** 4 figs., photo. **DWB, DLC**—RENÉ DESCARTES, a celebrated 17th century French revolutionary genius, was born on March 31, 1596 at La Haye, in Touraine. He died in Stockholm, Sweden, at the age of 54. He was acclaimed as an outstanding scientist in the field of pure and applied science. His contributions included the creation of analytical geometry and the development of a science of nature completely based on mathematical sequence. His investigations on meteors were published in 1637. Many of his other works and achievements are reported. *Subject Headings:* **1. Biography of René Descartes 2. Descartes, René.**—*N.N.* Ⓢ

12.1–39 551.5:92

Pavel Pavlovich Kokoulin, [in memoriam]. *Meteorologiia i Gidrologiia,* Leningrad, No. 5:59, May **1959.** photo. **DWB, DLC**—PAVEL PAVLOVICH KOKOULIN, Director of the Stalingrad Hydrometeorological Observatory, died on Feb. 10, 1959, at the age of 45. After graduating from the geographical department of the University of Leningrad in 1938 he entered the Yakut Hydrometeorological Service. From 1944–1948 he was director of the Latvian Hydrometeorological Service and from 1948–1951 he was director of the Leningrad Hydrometeorological Service and then director of the experimental section of the Principal Hydrometeorological Institute. In May 1951 he was appointed director of the Tsimlyansk Hydrometeorological Observatory. Among various instruments that he invented the following are mentioned: an accurate level meter, electrical contact wave meter, maximum-minimum wave meter, a float with temperature compensation, etc. *Subject Headings:* **1. Obituary of P. P. Kokoulin 2. Kokoulin, Pavel Pavlovich.**—*I.L.D.*

12.1–40 551.5:92

Pellisari, L., **L'attività meteorologica di Macedonio Melloni.** [Meteorological activity of Macedonio Melloni.] *Rivista di Meteorologia Aeronautica, Rome,* 18(3):64–65, July/Sept. **1958. DLC**—A great Italian physicist who worked in thermodynamics, volcanology and meteorology (1824–30) and founded the Vesuvius Observatory. He was involved in political upheavals of the time and was imprisoned for revolutionary activities. *Subject Headings:*

1. Biography of Macedonio Melloni 2. Melloni, Macedonio 3. Vesuvius Observatory.—*M.R.*

12.1–41 551.5:92

Hrubeš, Pavel and Havlíček, Vladimír, **Sedmdesát let akademika Václava Nováka.** [Academician Václav Novák; 70th anniversary.] *Meteorologické Zprávy*, Prague, 11(3):57, **1958.** photo. **DWB**—V. NOVÁK's principal contributions were in the fields of geographic meteorology, soil science, bioclimatology, agricultural meteorology and phenology. He is author or co-author of some twenty monographs and several hundred articles. He organized agrometeorological and phenological services and various research activities in Czechoslovakia. He is now a professor at Brno Agricultural and Forestry College. *Subject Headings:* **1. Biography of V. Novák 2. Novák, Václav.**—*G.T.*

B. APPLICATIONS

1. AERONAUTICS

See also: **Aeronautical met. forecasting textbooks** (George), 12.1–5; **All-weather flying manuals,** 12.1–16; **Aeronautical met. services** (Schneider), 12.1–32; **Case study of applied meteorology** (Moorman), 12.1–94; **Air route wind and temp. forecasting** (McRae, Phillpot), 12.1–253; **Airport climat., Lvov** (Bershchanskiĭ), 12.1–260; **Airport forecasting, Nellis AFB, Las Vegas** (Anderson), 12.1–261; **Cloud height probabilities** (Solomon), 12.1–381; **Airport visibility, Manchester, Eng.** (Inglis), 12.1–422.

12.1–42 551.501:551.591

Onishchenko, S. M., **O nabliudeniiakh nad vidimost'iu.** [Visibility observations.] *Meteorologiia i Gidrologiia*, Leningrad, No. 7:40–41, July **1959.** table, 4 refs. **DWB, DLC**—Various methods for the determination of visibility are discussed in comparison with the method recommended by the Main Geophysical Laboratory (N°7, 1955). Simplified tabulations of the observed data are suggested by the author for elimination of long computations. *Subject Heading:* **1. Visibility observation techniques.**—*N.P.S.*

12.1–43 551.501.1:629.13 551.5:629.13:374(479.22)

Poleznoe nachiaanie. [A useful undertaking (the Tiflis airport).] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:44–45, May **1959. DWB, DLC**—The workers of Tiflis Hydrometeorological Institute have published an appeal to workers at the Tiflis Airport wherein they propose, for the sake of increasing air safety and efficiency of operation in Transcaucasia, to organize lectures on aeronautical meteorology for the personnel of the Georgian Territorial Directorate of Civil Aviation; to organize at the discretion of the pilots the analysis of complex meteorological conditions encountered during flight in order to explain fully the physical conditions producing these phenomena and to provide consultation on general physics, mathematics and meteorology for crew members. In return the workers at the airport and in the airport meteorological service promised to report immediately after every trip the meteorological data collected, to carry out systematic observations especially during flight, to report to the members of the Institute all complex observations encountered, etc. *Subject Headings:* **1. Aeronautical meteorological services 2. Teaching of aeronautical meteorology 3. Tiflis, Georgian S.S.R.**—*I.L.D.*

12.1–44 551.574.7:551.507.354

Stallabrass, J. R. (*Natl. Research Council, Ottawa*), **Canadian research in the field of helicopter icing.** *Helicopter Association of Great Britain, Journal*, 12(4), Aug. **1958.** Reprint of 40 p. 13 figs., tables, 10 refs. **DWB** (M73.7 S782ca)—The Canadian National Research Council reports that the solution to the helicopter icing problem is now within sight. The effects and results of recent helicopter flight tests conducted in Canada in order to assess the effects of icing on helicopter performance as well as icing protection systems are reported. The application of electro-thermal deicing to the main rotor blades and various other considerations are discussed. *Subject Headings:* **1. Icing of helicopters 2. Icing prevention.**—*N.N.*

12.1–45 551.**574.7**:629.13

Lewis, William and Perkins, Porter J., Jr., **A flight evaluation and analysis of the effect of icing conditions on the ZPG-2 airship.** *U. S. National Advisory Committee for Aeronautics, Technical Note*, 4220, April **1958.** 66 p. 26 figs., table, 17 refs., 34 eqs. **DWB** (629.1308 U585tn)—Test flights conducted by the U. S. Navy in a number of typical icing conditions are described. The airship operated successfully in all icing conditions encountered, but the desirability of limited protection for certain components was indicated. Icing in clouds was confined to wires and small components, but freezing rain and drizzle produced some icing on the envelope also. Theoretical calculations are presented which suggest that, while hazardous icing in freezing rain can occur under certain meteorological conditions, the probability of encountering these conditions is very small in coastal areas and approaches zero 200 to 300 miles offshore. *Subject Heading:* **1. Icing of aircraft experiments.**—*NACA.*

12.1–46 551.**507.352**:681.14:621.38

Bendix Aviation Corporation, Ann Arbor, Michigan, **AN/AMQ-15 Weather Reconnaissance System.** Contract AF 33(600)-37984, First Quarterly Technical Progress Report, Aug. 15–Nov. 15, **1958.** Also: Second Quarterly Technical Progress Report, Nov. 15, 1958–Feb. 15, **1959.** each section repaged. figs., photos, tables, foot-refs. **DWB** (M(051) B458we)—Global meteorological and geophysical data are to be collected and partly processed by electronic computers in a jet-type aircraft capable of flight up to 55,000 ft at a speed of Mach 0.95. This air-borne observatory will be in operation during the period 1963–1970. The preparatory comprehensive work reported highlights development and testing of the most advanced techniques and equipment and other factors which will contribute to the success of the project. The progress reports provide valuable information on theoretical and practical aspects of every phase of instrumentation discussed, described and evaluated for measurements along the flight path: temperature, dewpoint, ozone, index of refraction, conductivity, condensation nuclei, albedo, electrical potential and conductivity, atmospheric composition and turbulence. Clouds will be checked by two radars. The AMQ-15 program incorporates a system designed to provide maximum efficiency under peace-time and military conditions. In the two reports, the following are outlined and discussed: 1) The horizontal subsystem; 2) The vertical subsystem; 3) The radar system; 4) The air sampling system and the data processing subsystem. Several types of instruments related are described and illustrated. *Subject Headings:* **1. Aircraft weather reconnaissance systems 2. Air-borne observational systems 3. Electronic data processing 4. Air-borne radar 5. Air sampling instruments.**—*W.N.*

12.1–47 551.**578.7**:551.**577.6**:629.13 551.**509.324.2**

Alt, Jean (*Météorologie Nationale, France*), **La grêle, danger de plus en plus grand pour l'aéronautique.** [Hail, the increasing danger for aeronautics.] *France. Secrétariat Général à l'Aviation Civile, Revue* No. 104:17–21, April 15, **1960.** fig., 3 photos, 6 refs.—The number of planes damaged by hail seems to have increased every year, owing probably to the increase in speed of planes and the greater altitude of flights. The author discusses the distribution, frequency, formation of hail and the meteorological circumstances related to the occurrence of hail. He enumerates the various types of damages caused to planes by hail. The importance of the damages depends not only on the thickness and number of hailstones, but also on the speed of the plane. Tests made at Indianapolis by the Civil Aeronautic Administration have proved that the importance of the cavity made varies according to the mass of the hail stone, the impact velocity, the angle of incidence, and the shape and properties of the metal struck. The hail stones with a diameter inferior to 2 cm do not penetrate the metal for speeds which do not exceed 200/250 knots. At low speeds (175 knots) the depth of the cavity does not increase much with the size of the hail stones; this increase becomes considerable for higher speeds (500 knots). The damages are important at speeds exceeding 250 knots when the hail stones have a diameter greater than 5 cm. The end of this article discusses hail forecasts and some practical considerations for flights in the vicinity of cumulonimbus clouds. *Subject Headings:* **1. Hail damage to airplanes 2. Hail forecasting.**—*A.V.*

12.1–48 551.556.3:551.558.21:629.135.15(234.1)
Fraysse, M., **Le vol d'onde dans les Pyrénées.** [The wave flight over the Pyrenees.] *Les Ailes*, Paris, 38(1708):12–13, Dec. 20, **1958.** fig. **DLC**—By winds, perpendicular on the axis, the mountains are bringing about series of lee waves favorable for "dynamical" flights. The author makes a practical study of the Pyrenean wave and comments on the flight of LOUIS TRUBERT on Nov. 3, 1957 in the Pau region showing the possibilities of lee wave flights over the Pyrenean relief. *Subject Headings:* **1. Gliding 2. Wind utilization 3. Lee wave flights 4. Pyrenees, France.**—*A.V.*

12.1–49 551.556.3:551.558.21:629.135.15(447)
Les vols de distance dans le Sud-Ouest. [Distance flights over southwestern France.] *Les Ailes*, Paris, 38(1701):14, Nov. 1, **1958.** 3 figs. **DLC**—The regions near the ocean are not favorable for gliding, because of the geographical limits and the small amplitude of the thermal instability phenomena. The Inter-Club center of Bordeaux registered some interesting distance flights during 1958. The article makes a study of the meteorological conditions during the different performances. *Subject Headings:* **1. Gliding 2. Wind utilization 3. Southwestern France.**—*A.V.*

12.1–50 551.5:629.139.1
Stoertz, George E. (*U. S. Geological Survey*), **Investigations in the Storelv area, East Greenland.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes*, No. 29, Dec. **1959.** p. 68–76. 4 figs. **DWB**—It is concluded that the Storelv area affords several potential sites for emergency aircraft landings for planes with ground runs up to 5000 ft (such as a C-124 or C-130) and at least one favorable site for hasty construction of a very long runway. It is estimated that with a small amount of additional field work a field party could locate a 4000-ft airstrip near Storelv, having an average depth of only 6 in. to firm outwash gravel, a maximum depth of only 10 to 12 in., and having relief and microrelief conditions at least as favorable as the proposed 11,500-ft runway. One of the most promising sites is oriented in a northeast-southwest direction, crossing the proposed runway near the south-east end. *Subject Heading:* **1. Aircraft landing sites.**—*Author's abstract.*

B2. AGRICULTURE

See also: **Agromet. forecasts** (Ulanova), 12.1–9; **Agromet. conferences** (Logvinov), 12.1–27; **Shelter belt effects, Jutland** (Marion), 12.1–63; **Radioactivity in soil** (Gustafson), 12.1–85; **Accumulation of radioactivity in soil and crops** (Barbier et al.), 12.1–86; **Heat balance of agric. soils** (van Duin), 12.1–330; **Microclimat. effects on agric.** (Sprague), 12.1–409.

12.1–51 551.5:63
†Mäde, A., **Ueber den Stand der Agrarmeteorologischen Forschung in der Deutschen Demokratischen Republik.** [Present status of agrometeorological research in the German Democratic Republic.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 3, Pt. 7, Sec. C, **1959.** 8 p. 151 refs. **DWB**—A list of institutions of the German Democratic Republic, where agrometeorological research is made, is followed by a list of 174 bibliographical references to articles published from 1953 to 1958 by researchers of these institutions. *Subject Headings:* **1. Agricultural meteorology 2. German Democratic Republic.** —*A.V.*

12.1–52 551.586:551.584:63
de Haan, H., **Klimaat en microklimaat.** [Climate and microclimate.] *Landbouwkundig Tijdschrift*, Wageningen, 72(6):227–228, March **1960.** **DA**—Report of the speech delivered by W. R. VAN WIJK on the occasion of the commemoration of the 42nd anniversary of the Agricultural High School at Wageningen. The action of the principal climatic factors on agriculture, the interdependence of these factors and their relationships with soil physics are

examined. The attention is particularly given to the microclimatology which is not purely descriptive but is in fact a physico-mathematical science. *Subject Headings:* **1. Agricultural meteorology 2. Weather-crop relationships 3. Microclimatology.**—*A.V.*

12.1–53 **551.509.612**:**551.524.37**:632.111.5

Weise, Rudolf, **Gedanken zur Erklärung der Frostschäden beim Einsatz von Beregnungsanlagen.** [Some ideas concerning frost damage to vineyards after sprinkling.] *Weinberg und Keller*, Frankfurt a.M., 6:332-335, **1959.** tables. **DA**—The article is a continuation of **Physikalische und Wetterkundliche Voraussetzungen für erfolgreiche Frost- Bekämpfung mit Beregnungsanlagen,** *Weinberg und Keller*, **1958,** pp. 99–107. It was stated twice over that vines protected against frost by sprinkling showed some damage, when isolated unprotected parcels had no damage at all. A complete explanation of this fact has not been given after the severe frost during spring 1959. A probable reason is perhaps to be found in the analysis of the vine-buds anatomy. The author gives a good detailed description of the influence of cold air in spring on the vine buds and vine leaves, before and after sprinkling. Measurements of temperature and air humidity in vineyards during sprinkling have been realized during a cold night. The experiments proved that high air humidity (95%–100%) accompanies the moment of lowest temperature occurrence. Therefore, an air moistening can only produce a rise in temperature of one tenth of a degree as it is shown in a table. Nevertheless conditions are not the same at the beginning and at the end of the frost. It is difficult to protect the vines by sprinkling in the beginning of their growth. In the process of protection by sprinkling, it would be very interesting to perform some experiments by increasing the surfaces collecting the droplets, employing shields so that they do not prevent the outflow of the cold air. *Subject Headings:* **1. Frost damage to vineyards 2. Frost protection of vineyards 3. Sprinkling 4. Frost danger.**—*A.V.*

12.1–54 **551.524.371**:632.111.5:634.8

Witte, K., **Neue Ergebnisse zur Frage der direkten Frostschutzberegnung.** [New results in the field of frost protection by water sprinkling.] *Weinberg und Keller*, Frankfurt a.M., 6(3):95–100, March **1959.** 2 tables. **DA**—Water sprinkling was given up during the spring of 1957 due to the ignorance of certain factors. Most of these factors are commented upon: the density of water sprinkling (mm/hr); the effect of the interruption in sprinkling (rotation speed of sprinkler); the running of temperature; the influence of the receiving surface and height of plants and the influence of wind on this protection method. *Subject Headings:* **1. Frost protection of vineyards 2. Sprinkling.**—*A.V.*

12.1–55 **551.524.371**:632.111.5:634.8

Weise, Rudolf, **Physikalische und wetterkundliche Voraussetzungen für eine erfolgreiche Frostschutzberegnung.** [Physical and meteorological conditions favoring the results in frost protection of plants by water sprinkling.] *Weinberg und Keller*, Frankfurt a.M., 5(3):99–107, March **1958.** 13 refs. **DA**—It is recommended to employ water quantities below 2.5 mm/hr for sprinkling and to set the equipment for obtaining an unvarying and uninterrupted moistening of plants. It is possible to diminish the quantity of water without decreasing protection efficiency, when evaporation is suppressed by increasing the air humidity and temperature of sprinkling water. These two results may be achieved with the help of an industrial perfection of the equipment. Protection against frost is possible after a good study of the field climate and especially of the winds. The author gives a formula for the calculation of the heat balance (B): $B=L+S+K+V+A$, where: L=all energy amounts given or withdrawn by the air; S=energy producing heat and supplied or radiated by vines; K=heat amount supplied or given back by vines; V=energy taken by evaporation or liberated by transformation from water vapor into water and from water into ice; A=energy producing heat and provoked by plant respiration. *Subject Headings:* **1. Frost protection of plants 2. Sprinkling.**—*A.V.*

12.1–56 631.51:**551.579.5**:631.67

Fesko, K. Ia. and Strugaleva, E. V., **Primenenie glubokoĭ vspashki dlia regulirovaniia vodnogo i solevogo rezhimov pochv Aleiskoĭ orositel'noĭ sistemy.** [Use of deep plowing for the regulation of the water and salt regime in the soils of the Aleisk irrigation system.] *Poch-*

vovedenie, Moscow, No. 1:104–112, Jan. **1959.** 2 figs., 6 tables, English summary p. 112. **DLC**—The measures adopted to improve the conditions of irrigated soils; deep plowing with and without the turning of the surface layer of the soil, and deep loosening of soil experimented on field plots of the Aleisk irrigation system in the Altai Province in 1954-1956, contributed to the accumulation of winter and spring precipitation in the soil and to secure a better distribution of irrigated water. Deep plowing without the turning of the sod layer facilitates the salt leaching by rain and irrigation water. Two graphs showing the dynamics of moisture content changes in the soil caused by deep and normal-depth plowing, all other conditions being the same, are added. *Subject Headings:* **1. Plowing effects on soil moisture 2. Irrigation experiments 3. Altai Province, U.S.S.R.**—*A.M.P.*

12.1–57 551.521:633.1 551.521.12(470)

Rusin, N. P., **Radiatsionnyĭ balans polia, zaseiannogo zernovymi kul'turami.** [Radiational balance of a grain field.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 77:43–56, **1958.** 4 figs., 9 tables, 2 eqs. **DWB, DLC**—The author describes the day by day characteristics of the radiation balance of agricultural fields, sown with crops during the growth period on the basis of field observations carried out during two growth seasons in 1953 and 1954 in the Dubovskaya district station (Rostov Region) and additional special observations. Daily actinometer observations were made from 0800 to 1700 o'clock every two hours and at 0700 and 1900 o'clock observations were made every 10 minutes. Nocturnal observations were made once every three days at 10 minute intervals 2200, 0001 and 0004 o'clock. Extensive data are presented on the mean hourly values of the components of radiation balance on clear days (cal/cm² min) at Dubovskaya for spring wheat 1953; mean values of hourly components of radiation balance by five days without considering cloudiness (cal/cm² min) for spring wheat 1953, and barley 1954; maximum and minimum values of S (direct radiation), D (scattering), Q (total radiation), R_s (short wave radiation) and B (radiation balance), mean daily values of R_s, B and A on block ploughed soil, mean daily totals of components of radiation balance on clear days at Dubovskaya, etc. The relationship of radiation heat to growth and developmental stage of grain is analyzed. *Subject Headings:* **1. Radiation climate of fields 2. Albedo of grain fields 3. Dubovskaya, Rostov Oblast, U.S.S.R.**—*I.L.D.*

12.1–58 551.577.38:633.73 551.506.8

Pagacz, E. A., **Quelques considérations sur la floraison du caféier.** [Some reflections on the coffee-shrub flowering.] *Belgium. Direction Générale de l'Agriculture, Bulletin Agricole du Congo Belge et du Ruanda-Urundi*, 50(6):1531–1540, Dec. **1959.** 3 figs., 3 tables, 4 refs. **DLC**—The progress of coffee-shrub flowering is, under natural conditions, arrested by the dry season. This arrest in flowering resumes 6 to 18 days after sufficient rainfall. When a drought period is followed by insufficient rainfall or two successive drought periods interrupted by a rainy period, the coffee-shrub does not attain its full blossoming. The author made an experimental study of normal flowering of the coffee-shrub in the greenhouses of the University at Louvain. Temperature equal to 23°–25°C and humidity about 60–80% are favorable to the growth of the coffee-shrub, but flowering is not complete under these conditions. The normal and complete process of flowering requires a rest in growth. The treatment with gibberellic acid stops growth. From the practical point of view, the spraying of cultures, if necessary, should lead to general and clumped flowering. *Subject Headings:* **1. Phenology 2. Drought influences on coffee-shrub flowering 3. Louvain University, Belgium.**—*A.V.*

12.1–59 551.586:633.2:636.3(584.6)

Fedoseev, A. P., **Klimaticheskie usloviia vypasa ovets na zimnikh pastbishchakh.** [Climatic conditions of pasturing sheep on winter pasturages.] (In: U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoi Sluzhby, **Voprosy Agrometeorologii,** ed. by F. F. Davitaia and M. S. Kulik. Moscow, **1958.** p. 85–87. 3 refs.)—The meteorological factors determining winter absence of fodder on pastures in Kazakhstan and western Pricaspia comprise the following: height of snow cover is greater than 10 cm with a density greater than 0.32; height >20 cm with a density >0.25 or a height >30 cm with any density; the ice crust upon the snow or an ice layer in the snow has a thickness 1.0 cm and more (with snow cover up to 10 cm) and a thickness of 0.5 cm and more (with a snow cover greater than 10 cm); strong winds and low air temperatures in a given combination; snow storms, intense snowfall and fogs at least 2 hours in duration; and ice crusted ground. Any day with any of these phenomena is unsuitable for pasturing sheep. The number of unsuitable days during winter serves as a characteristic of the degree of unsuitability of weather conditions for winter pasturing of sheep and may be taken as an index of the duration of the period of keeping the sheep in pens. Long period climatic data for Kazakhstan and Pricaspia based upon these criteria are presented. *Subject Headings:* **1. Sheep breeding 2. Pastures 3. Climatic data for Kazakh S.S.R. 4. Climatic data for Pricaspia 5. Kazakh S.S.R. 6. Pricaspia, U.S.S.R.**—*I.L.D.*

12.1–60 551.586:551.525.2:551.579.5:636.089

Mitchell, K. J., **Weather and pasture conditions associated with outbreaks of facial eczema.** *New Zealand Journal of Agriculture,* Wellington, 100(2):177–183, Feb. 15, 1960. 2 figs.—After the outbreak of facial eczema and the warning of it given by the Livestock Division of the Department of Agriculture, the weather associated with widespread outbreaks of facial eczema was studied. It was found that the major outbreaks recorded between 1916 and 1939 had occurred when temperatures during the whole summer and autumn (November to April) had been well above normal. One also emphasized the importance of high soil temperatures. Recent researches emphasized that soil moisture conditions were also important which had not been made clear by the investigations of the first studies made in this field. *Subject Headings:* **1. Weather effects on livestock 2. Soil temperature and soil moisture effects on facial eczema.**—*A.V.*

B3. FORESTRY—FIRE WEATHER

See also: **Precip. effects on aspen growth** (Froelich et al.), 12.1–388.

12.1–61 551.556.2:551.594.12(478)

Lavrov, V. S., **Rezul'taty elektrometricheskikh issledovaniĭ vliianiia polezashchitnykh lesonasazhdenii na izmenenie rezhima temperatury i vlazhnosti vozdushnogo potoka u poverkhnosti Zemli.** [Results of electrometric investigations on the influence of forest shelter belts on the temperature and moisture regime of the air current near the earth's surface.] (In: Akademiia Nauk SSSR. Institut Geografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** Moscow, **1957.** p. 322–331. 12 figs., 4 refs.) **DLC** (QC940.ROA6)—Method and results of an investigation of the ionic state of the air, which can serve as an indirect criterion for evaluating the purity of air, and for a more precise determination of the temperature and moisture regime, carried out by the Dept. of Physics of Rostov (Don Pedagogical Institute) in the Salsk Steppe in August 1949–1952 are described. It is shown that the distribution of light and heavy ions and of the quantity of dust, may help to get an idea of the changes of regime in the air current near the earth's surface under the influence of a shelter belt. These changes depend also on the direction of the air current, and the nature of underlying surfaces adjoining the forest belt. *Subject Headings:* **1. Forest shelter belt effects 2. Ion distribution near shelter belts 3. Micrometeorological studies 4. Salsk Steppe, European U.S.S.R.**—*A.M.P.*

12.1–62 551.556.2

†Lorch, J. (*Dept. of Botany, Hebrew Univ. of Jerusalem*), **Analysis of windbreak effects.** *Research Council of Israel, Bulletin, Sec. D., Botany,* 6(4):211–220, June **1958.** 35 refs., 3 eqs.—The effect of windbreaks is generally evaluated by measuring their influence on wind speed. The per cent of decrease in wind pressure and energy due to a decrease of, say, 10% in wind speed is independent of the initial, unbroken wind speed. On the other hand, a similar per cent of decrease in wind speed produces widely different effects on transpiration, photosynthesis and other processes—here conveniently discussed under the heading "physiological"—depending on whether the free wind speed is higher or lower. The breaking of strong winds, in particular, has a comparatively small effect on the physiological functions affected by wind, while at the same time pressure and energy (second and third degree functions of wind speed respectively) are considerably reduced. Analysing two cases of outstanding windbreak effectiveness—bananas in the Jordan Valley, Israel, and wheat in Canada—it is found that the variation in

yield follows the pattern of wind damage to leaves, and of soil moisture produced from snow drifts, respectively. Both these patterns, though reflecting transient wind conditions, persist and are effective even in calm air; both are related to physical action of wind, to wind pressure and energy, which respond markedly to any decrease in wind speed. Therefore, the benefit derived from protecting crops which are not physically damaged by wind in fields not subject to snow drift may be assumed to reach, at best, only a small fraction of the benefit observed in the above instances. All available evidence shows that the so-called effective range of a windbreak depends on the purpose for which it is grown not on its height and density. *Subject Headings:* **1. Windbreak effectiveness 2. Windbreak purposes.**—*Author's abstract.*

12.1–63 551.586:63 551.584.41:551.556.2

Marion, J., **Les brise-vent au Jutland.** [Shelter belts in Jutland.] *Revue Forestière Française*, Nancy, No. 2:129–141, Feb. **1960.** 3 figs.—Associations have been set up in Denmark for erecting shelter belts to improve the reclaimed areas of Jutland. A set of laws specifies the construction of shelter belts and subsidy is granted by the Government. The principles of shelter belt planting are based on the distribution of winds, the types of soils, the cultures to protect, the extent of the holdings. These factors together with the climatic factors determine the orientation of the rows, the permeability of the belts, their spacing and their height, etc. . . . Screens of trees exert a favorable influence on cultivations and modify the microclimate, namely the following factors: humidity of air, moisture of soil, temperature of air and appearance of frost, temperature of soil and transpiration of plants. After the survey of the inconvenience and advantages of shelter belts, the author investigates the possibilities of application in France. *Subject Headings:* **1. Agricultural meteorology 2. Shelter belts 3. Shelter belt effects on microclimate 4. Jutland, Denmark.**—*A.V.*

12.1–64 551.5:595.7:582.47:632.7

Balescu, O. I., **Consideratii meteorologice asupra intervalului de combatere a *Lymantriei Monacha* in regiunea Borsec.** [Meteorological considerations on the period of combating *Lymantria Monacha* in the Borsec Region.] *Meteorologia Hidrologia și Gospodărirea Apelor*, Bucharest, 3(2/3):112–113, **1958.** fig. **DWB.** Also: Stoica, Constantin, **Citeva aspecte ale timpului din perioada de combatere a insectei** *Lymantria Monacha* **in Sectorul Brosteni.** [Some aspects of the weather during the period of combating the ***Lymantria Monacha*** insect in the Brosteni Sector.] *Ibid.*, 3(2/3):113–115, **1958.** 6 figs., table. **DWB**—During a ground and airplane spraying campaign designed to control damage to conifers by *Lymantria Monacha*, meteorological studies were made on hourly observations of a special network of 8 stations and a center, and on data of the regular network. The general weather development during the campaign (May–June 1958) is described and temperature and humidity data and synoptic charts are presented. *Subject Headings:* **1. Meteorological conditions for spraying 2. Insect control 3. Conifers 4. Romania.**—*G.T.*

12.1–65 551.588.6:551.584.2

Paszyński, Janusz, **Rolnicze badania mikroklimatyczne.** [Agricultural microclimatic research.] *Przegląd Geograficzny*, Warsaw, 29(4):789–795, **1957.** In Polish; Russian and English summaries p. 794–795. **DWB**—The author discusses Vol. 71 of *Agricultural Science Annals*, which is entirely devoted to climatological problems. It contains twelve works by various authors, setting forth the findings of investigations conducted in 1951 in a number of scientific centres (Institute of Pedology, Land Improvement Institute, etc.). The majority of the works relate to the effect of tree cultivation upon the microclimate of adjacent areas. *Subject Headings:* **1. Forest influences 2. Microclimates.**—*Author's abstract.*

12.1–66 551.509.32:551.584.41/2

Platt, R. B. and Williams, Esther L., **Can microclimate be predicted?** *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 2, Phytological Bioclimatology), **1957.** 3 p. table, 2 refs. **DWB**—A preliminary report on a microclimatic study of two ecological extremes, an open field and an adjacent woodland, located in the upper coastal plains of the southeastern United States (Emory University Field Station, southwest Georgia) in order to determine to what extent various elements of the microclimate can be predicted for this particular area. Temperature and relative humidity were recorded automatically at 0, 3, 6, 15 and 50 feet; wind velocities were measured at 3 and 50 ft; and evaporation (with Livingston atmometers) at 3, 6, 15 and 25 ft. The temperature and relative humidity gradients for five levels between 0 and 50 ft for summer and winter, for the open field and woods, are given in a table. A very high consistency in the direction of the gradient is evident. *Subject Headings:* **1. Microclimate forecasting 2. Field microclimatology 3. Forest microclimatology 4. Atlanta, Ga.**—*I.L.D.*

12.1–67 551.584.41:634.956

Pasák, V., **Einfluss der mechanischen Bodenvorbereitung auf das Mikroklima bei der Aufforstung von verunkrauteten Kahlflächen.** [Influence of mechanical soil preparation on microclimate during afforestation of weed-infested, denuded areas.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 2, Phytological Bioclimatology), 1957. 3 p., 7 figs. **DWB**—The afforestation of weed infested soils presents a microclimatic problem in its initial phases. In spring the soil temperature is lower in a field with weeds 1 meter tall than at the edge of an adjacent spruce forest; the temperature at 5 cm above the ground rises more rapidly in a weed cover than at the same level at the margin of a forest, etc. The effect of mechanical soil cultivation, of the planting and of soil protection crops in providing suitable microclimatic conditions for the growth of seedlings in afforestation are discussed. It is concluded that its most favorable microclimatic conditions for afforestation are obtained when mechanical soil preparation over entire areas with heat absorbing soils is combined with the planting of soil protection crops in alternate rows. Temperature isopleths in a spruce forest, in a weed infested field and a graph of soil moisture content, etc. are presented. *Subject Headings:* **1. Forest microclimatology 2. Afforestation of weed infested soils.**—*I.L.D.*

12.1–68 551.584.41:634.94

van der Poel, A. J. and Stoutjesdijk, Ph. (*Lab. of Plant Taxonomy and Plant Geography, Agricultural Univ., Wageningen*), **Some microclimatological differences between an oak wood and a Calluna heath.** *Wageningen. Landbouwhogeschool, Mededelingen*, 59(2), 1959. 8 p. +2 plates, 7 figs., 3 tables, 3 refs. **DLC**—This article compares the micro-meteorological observations (temperature, evaporation and vapor pressure) made simultaneously in and above an oak wood and a Calluna heath on two days of August 1955 in the Netherlands. Tables and graphs present data on temperature at a depth of 5 cm in the soil; on temperature and evaporation at ground surface, 0.10 m, 2 m, 8 m (under the canopy) and 13.5 m (just above the canopy) in the oak wood; on temperature at 0.10 m, 0.50 m and 2 m on the heath and evaporation at 0.10 m, 0.50 m and 1.80 m on the heath. These measurements are also compared with temperature and evaporation data from the nearest meteorological stations. The maximum of the temperature on the heath is higher at all levels and the minimum lower at all levels than in oak wood and above grass. Oak wood has the lowest temperature amplitude at all levels. At 5 cm depth in the soil, grass has highest and heath lowest maximum and minimum temperatures. An unexpected great difference appears between evaporation over the heath and over the wood canopy, giving daily values of 8.7 cm^3 and 6.8 cm^3 above heath and 6.3 cm^3 and 4.1 cm^3 above oak wood. *Subject Headings:* **1. Forest microclimatology 2. Oak forest 3. Calluna heath 4. Forest temperatures 5. Evaporation from forests.**—*A.V.*

12.1–69 551.556:632.187

Rainbird, A. F., **The problem of wind in the prevention and control of bush fires.** (In: *Fire Weather Conference, Melbourne, Australia, July 1958, Proceedings*, issued Melbourne, 1958. Conference Paper, No. 6 (12 p.) 4 refs.) (Reproduction of p. 41–52 from unidentified source.) **DWB**—The physical influence of wind on the spread of fires is discussed. The main problems of both the Fire Authority and the meteorologist concerning wind influence on the forecasting, spread and control of bushfires are considered. Indications are given of the main features of wind influence which call for extensive investigation by both the Fire Authority and the meteorologist. Three typical examples of the importance of wind in fire spread and control are given from past fire experience in New South Wales. *Subject Headings:* **1. Wind effects on forest fires 2. Forest fire control.**—*Author's abstract.*

B4. MEDICINE

See also: **Thermal diffusivity of fabrics** (Powers, Botsch), 12.1–92; **Space medicine** (Haber), 12.1–151.

12.1–70 551.586:616.248

Daubert, K. (*Deutscher Wetterdienst*), **Atmosphärische Einflüsse bei der Auslösung von Asthma-Anfällen.** [Atmospheric influences on asthma attacks.] *Die Heilkunst,* Munich, No. 7:1–2, July **1958.** —In the study of asthma, the different conditions of the patient and also the atmospheric influences have to be considered. Researches were made by the medico-meteorological research center of Tübingen to establish the daily and yearly running of the asthma in the Tübingen region. The factors which provoke asthma such as heat, cooling, air pollution, smoke, fog, dust, pollen, etc. are studied. Positive results of climatotherapy on asthma have been found. *Subject Headings:* **1. Weather effects on asthma 2. Asthma 3. Tübingen, Germany.**—*A.V.*

12.1–71 551.510.42:612.014.4

Breslow, Lester (*Bureau of Chronic Disease State Dept. of Public Health, Berkeley, Calif.*), **Health effects from repeated exposure.** (In: National Conference on Air Pollution, Wash., D. C., Nov. 1958, **Proceedings,** pub. **1959.** p. 197–201.) **DWB** (M10.42 N277pr). Also: **Discussion by** Leonard M. Schuman (*Univ. of Minnesota, Minneapolis*), *Ibid.*, p. 202–203. The findings of the several investigations briefly reported in this paper add up to a substantial justification for concern about the long term effect of repeated exposure to air pollution. Evidence is gradually accumulating which suggests that air pollution of various types, chemically and physically, may be involved in such important lung conditions as chronic bronchitis, asthma, emphysema, and lung cancer. Experimental work on animals demonstrates adverse biological effects from air pollutants and health surveys are beginning to quantify the important sociopsychological effect on human beings. To remedy this situation the urgent need is to step up research, both epidemiological and laboratory research, to determine the nature and extent of damage to health, and the specific air pollutants which are responsible for it. Only in this way can control efforts ultimately be pinpointed to assure the prevention of health damage. In the mean time, of course, air pollution control efforts should be pressed energetically on the basis of present knowledge. In the discussion by SCHUMAN, the suggestion for intensified epidemiologic research has been reaffirmed and several related problems have been mentioned. *Subject Heading:* **1. Atmospheric pollution effects on health.**—*I.S.*

12.1–72 551.586:551.510.42:612.015.3

Fouchet, J., **Une étude des variations saisonnières du métabolisme.** [Study on seasonal variations of metabolism.] *La Nature,* Paris, No. 3298:68-70, Feb. **1960.** 2 figs. **DLC** — Measurements of diurnal metabolism made on numerous subjects during the period 1952–1957 have produced evidence of a fairly characteristic seasonal variability. These measurements have shown a certain decrease of metabolism during the summer months. On the other hand the temperature fall by the end of September produces the rise of metabolism which remains rather moderate until December, when one observes a further increase followed by a sudden decrease in January which cannot be explained. Towards the end of spring is observed a new diminution of combustion which drops for a short period to a level lower than that of the warmest months. On the other hand, the atmospheric pollution, the aerosols and more particularly the pollen appearance, seem to exert an influence on metabolism. Air ionization variations have no effect on metabolism and seem to eliminate the influence of atmospheric electricity which has hitherto been considered as preponderant by several bioclimatologists. *Subject Headings:* **1. Seasonal metabolism variations 2. Atmospheric pollution effects on metabolism.**—*A.V.*

12.1–73 551.586:656.08

†King, Erwin, **Medizin-meteorologische Einflüsse auf den Strassenverkehr.** [Meteorological-medical influences on road traffic.] *Zeitschrift für Verkehrssicherheit,* Frankfurt a.Main,

4(3/4):116–136, **1958.** 5 figs., 41 refs., German and English and French summaries.—Today, it is possible to prove that certain weather conditions have a definite influence on the human body. However, the effect of the weather is not to be considered as the only influence of a decisive nature, but only as a contributory factor. The influence of the weather conditions is not limited to the appearance of certain diseases; the psychological and physical conditions are also affected. In other words, important factors such as individual reaction, vigilance and sense of responsibility which play a decisive role for the occurrence of accidents, are also influenced by weather conditions. However, the connection between weather and human body as well as the effect of the weather as such could not be definitely ascertained. Moreover, the influence of the weather may be different as to its intensity and on the individual involved. It is dependent upon the constitution and the condition of the vegetative nervous system of a person. The author discusses the various factors involved and their importance with regard to traffic safety. The elements to be considered are: a) the subjective calorific requirement of the body exposed to certain temperature values and humidity contents of the air; b) the subjective stress caused by light effects (ultraviolet rays, visible rays, infrared rays); c) influences due to chemical substances in the atmosphere; d) influence due to air-pressure and air-pressure oscillation; e) influence of electric phenomena. The influence of meteorotropic weather conditions on the human body is also mentioned. The author also examines the question whether or not definite statements can be made about weather influences being generally responsible for the occurrence of traffic accidents or that such accidents are only in isolated cases due to the prevailing weather conditions. *Subject Headings:* **1. Medical meteorology 2. Weather effects on man 3. Weather effects on traffic accidents.**—*A.V.*

12.1–74 551.586:656.08

†Baumgärtner, Hans; Malsch, Wolfgang; Rusz, Adolf et al., **Wetter und Verkehrswesen.** [Weather and traffic.] *Zeitschrift für Verkehrssicherheit*, Frankfurt a.M., 3(3/4):99–135, **1957** and 4(1/2):50–67, **1958.** 2 figs., 4 tables, foot-notes. German, English and French summaries. —The National Weather Service in Germany got under way in more definite form about the year 1850. Responding to the growing demand for meteorological material for observation purposes the network has developed steadily. At present there are approximately 500 major stations spread over the area of the Federal Republic as well as 2800 posts recording atmospheric fluctuations. Atmospheric factors, such as wind and poor visibility which might cause obstacles or danger to traffic are dealt with. Just as the wind not only diverts vehicles from their course or puts obstacles in their way but also affects the hearing, so fog, apart from disturbing visibility, has also a deafening effect on the driver. The intensity and frequency of the appearance of wind and fog present considerable variations in localities the cause of which can be ascertained by meteorological observation and measurement. It would, therefore, be advisable in planning new routes to obtain an official weather report so that regions of unfavorable weather conditions can be avoided. Visibility and light, conditioned by dark and twilight, may have an influence on the occurrence of accidents. In estimating the statements made by witnesses on the subject one must remember that the sight of some people varies with others in the darkness and that this may interfere with the accuracy of a witness's statement. An exact statement can often be made by means of calculations supported by astronomical and meteorological facts which, on account of their difficulty, would be best undertaken by meteorological experts. Apart from high temperature values during the summer, frost is another natural phenomenon impeding and endangering the traffic on account of frost heaves the number of which, during the last years, constantly increased. The slipperiness of the road (snow glaze, glaze, and snow ice) is another factor closely connected with the temperature and atmospheric precipitation. Moreover, the traffic may be seriously hampered by snowdrifts and snowslides, the physical appearance, formation, and consequences of which can be described in detail. Finally, it is possible that flood waters may become a danger and obstacle for the traffic. Disturbances caused by such floods have frequently the disadvantage that it takes considerable time to eliminate them. The evaluation of the meteorological observations has to be accomplished within the shortest time possible. For this reason all meteorological data are transmitted with the aid of an universally applied code to special collecting centers having the task to ensure their proper distribution. On account of such messages the Central Weather Bureau of the German Federal Republic at Offenbach a.M. is in a position to issue,

twice a day, weather maps for the entire northern hemisphere. A current analysis of the weather forecasts has revealed that, at an average, 85 p.c. of all forecasts made are correct. considering the present note of the science of meteorology, the forecasts with regard to wind and temperature are more precise than those for rainfalls. Great importance is attached to the fact that all persons and offices concerned are informed as precisely and quickly as possible. *Subject Headings:* **1. Weather effects on traffic accidents 2. Weather sensitivity 3. Traffic accidents. I. Schulze, Alfred II. Zimmermann, Gerhard.** *Authors' abstract.*

12.1–75 551.586:612:629.19:656.7

Denton, Derek (*Dept. of Physiology, Univ. of Melbourne*), **Recording of physiological functions of a suitable experimental animal during protracted space flight.** *Australian Journal of Science*, Sydney, 20(7):202–207, March/April **1958.** 5 figs., 5 refs. **DLC**—The use of animals as predecessor to man in space travels is advocated from a biological and medical point of view. The preference of dogs for experimental purposes depends largely on the basic likeness of a dog's physiology and biochemistry to that of man. It is essential that a state of mutual trust be established between the experimentor and his dog in order to ensure reliable facts on vital functions during flights. Various gears and instruments to be worn by animals in space flights are discussed and illustrated. *Subject Headings:* **1. Physiological effects of space flights 2. Space flights with dogs.**—*W.N.*

12.1–76 551.507.362.1:613.693

Strughold, Hubertus (*School of Aviation Medicine, USAF*), **From aviation medicine to space medicine.** *Air University Quarterly Review*, Wash., D. C., 10(2):7–16, **1958.** 55 refs. **DLC**—The properties of the environment in rocket-powered flight have been discussed as those of free space. The report also describes rockets in their motion as celestial bodies and expects that soon other celestial bodies will be reached from the earth. Detailed explanation of facts on the pioneer organizers of space medicine in the Air Force, the developments toward space medicine, astrobiology, and the progress in aero medical research are given. *Subject Headings:* **1. Interplanetary flights 2. Space medicine.**—*N.N.*

B5. RADIOACTIVITY

See also: **Transport of radioactive debris** (Drogaïtsev), 12.1–354.

12.1–77 551.510.7:546.02:539.16

Arnold, James R. and Martell, E. A., **The circulation of radioactive isotopes.** *Scientific American*, N. Y., 201(3):84–94, Sept. **1959.** 8 figs., 2 photos. **DWB, DLC**—The distribution of radio isotopes in their physical and biological environments is discussed. The report includes a summary of the investigations that were made by WILLARD F. LIBBY (then at the University of Chicago) after World War II, on the transport of radio isotopes from soil, rocks and atmosphere. It gives the distribution of uranium, thorium, etc. as well as the effects of fallout. *Subject Heading:* **1. Radio isotope distribution.**—*N.N.*

12.1–78 551.510.7

Philippot, J. Cl., **Étude de la radioactivité atmosphérique.** [Study of atmospheric radioactivity.] Photostat of separated pages from unidentified source. 9 figs. **DWB** (M10.7 P552et)—Experimental procedures for a study of atmospheric radioactivity is given. The report familiarizes the reader with the basic facts on radioactivity and outlines steps for its detection and the necessary precautions to be taken in such studies. It includes the results of the investigations during 1955. *Subject Heading:* **1. Radioactivity in the atmosphere.**—*N.N.*

12.1–79 551.510.7 551.577.7

Schumann, G. and Eulitz, G., **Die jahreszeitliche Variation der stratosphärischen Fallout-Komponente.** [Seasonal variation of stratospheric fallout.] *Die Naturwissenschaften*, Berlin, 47(1):13–14, Jan. 15, **1960.** 2 figs., 9 refs. **DLC**—Measurements of the content in Sr_{90} at Heidelberg. Departure from STEWART's measurements is 20%. A correlation is demonstrated between the minimum of fallout and the drift of long period nuclei. The general evolution and the relative greatness of the maximum tally with the minimum values and the Sr_{90}. Ratio between the absolute activities is about 100. Contrary to the presumption that the erratic nuclear experiences are responsible for the increase in radioactivity, stands the well marked regular periodicity indicated by measurements made on samples of air and precipitation. The explosions of autumn 1958 had an influence on the measurements. *Subject Headings:* **1. Radioactivity in the upper atmosphere 2. Radioactive fallout 3. Annual atmospheric radioactivity variations 4. Radioactive precipitation.**—*A.V.*

12.1–80 **551.510.72**:551.24:551.510.5

†Styra, B. I., **K voprosu o krugooborote estestvennykh radioaktivnykh veshchestv mezhdu zemnoĭ poverkhnost'iu i atmosferoĭ.** [On the question of the exchange of natural radioactive materials between the earth's surface and the atmosphere.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai,* 10(1):55–61, **1959.** 61 refs., 8 eqs. Lithuanian and English summaries p. 59–60.—The question of the exchange of decay products between the Earth's surface and the atmosphere is analyzed. One-day balance has been estimated and, furthermore, it has been shown that, by exhalation, the quantity of Rn getting into the atmosphere from the whole Earth's surface in the course of one day is equivalent to 5.15 tons of Ra. A part of it equal to 3.12 tons comes back together with atmospheric precipitation and 2.03 tons are eliminated in the process of decay. The stream of Rn and its daughter products from the land is computed on the supposition that the sea does not emanate. The obtained magnitude comes to 280 tons of Ra equivalent in a period of one year. The value obtained in estimating the average radioactivity of precipitation above an ocean is as much as 10^{-14} Cu/g. *Subject Headings:* **1. Radioactive precipitation 2. Radioactive emanations 3. Earth-atmosphere radioactive exchange.**—*Author's abstract.*

12.1–81 **551.510.72**:662.2:539.1

Ackermann, Paul, **Einige Beispiele der Untersuchung der Luft auf Radioaktivität.** [Some examples of the examination of air as to radioactivity.] *Schweizerische Naturforschende Gesellschaft, Geneva, Verhandlungen,* 137:71, **1957. DLC** (Q67.S4)—The displacement of radioactive clouds originated by experimental explosions in the U. S. and Russia is brought in relation to the weather situation. The radioactive clouds of the Russian explosion of Jan. 18, 1957; the experiment of March 8, 1957; the explosion in Nevada, August 7, 1957, and the experiment of Aug. 18, 1957 are investigated. *Subject Heading:* **1. Radioactive clouds.**—*O.T.*

12.1–82 **551.510.7**:662.2:539.1

Lockhart, L. B., Jr. (*Naval Res. Lab.*), **Atmospheric radioactivity levels at Yokosuka, Japan, 1954–1958.** *Journal of Geophysical Research,* Wash., D. C., 64(10):1445–1449, Oct. **1959.** 2 figs., 4 tables, 6 refs. **DLC, DWB.** Also issued as *U. S. Naval Research Lab., NRL Report* 5301, April 21, **1959.** 7 p. 2 figs., 4 tables, 4 refs. **DWB** (M(055) U58r)—For the past ten years the U. S. Naval Research Laboratory has had under way a program relating to the radioactivity of the atmosphere. This has involved the study of both natural and man-made radioactive materials in the air and their distribution, transport, and removal from the atmosphere. This report summarizes measurements made on the concentrations of some natural radioactive materials and of gross fission products in the air at ground level at Yokosuka, Japan, during the period 1954–1958. These data support the conclusions that the concentrations of both natural radioactive products and fission products in the air at ground level vary widely from time to time, that the change in the concentration of the natural radioactivity is related in a general way to the phenomena that control precipitation, and that the trend of the fission-product concentration has been upward during the past few years as a result of increasing nuclear testing. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Yokosuka, Japan.**—*Author's abstract.*

12.1–83 91.04(984) **551.510.721**

Wiśniewski, Wiesaw (*Observ. Astron. Uj Kraków*), **Radioaktywne zanieczyszczenia atmosfery w fiordzie Hornsund (Spitsbergen 18 III–12 VIII 1958 r.).** [Atmospheric radioactive fallout at Hornsund Fjord (Spitsbergen March 18 to Aug. 12, 1958.)] *Acta Geophysica Polonica,* Warsaw, 7(2):237–241, **1959.** fig., 4 tables. English summary p. 241. **DWB,**

DLC—The paper gives the results of measurements of radioactive fallout for the period March 18 to August 12, 1958. Radioactivity of rain, snow and dust was determined by means of ombrometric methods, similarily as in the preceding period (see p. 130). The number of measurements of selected proofs of higher activity was increased. Mean activity for this measuring period was 0.17: mC/km²/day. In fig. 1c are also given comparative results obtained by the Swiss Expedition by means of the air filter method. They were communicated to us on the occasion of our visit to the Swedish-Finnish-Swiss Base in Murchison Bay in August, 1958. From our results regarding depth of rainfall (mm) and activity (mC/l) measurements it appears that steady weak rain was in our case more radioactive—it collects more radioactive dust than short intensive rainfalls. *Subject Headings:* **1. Radioactive fallout 2. Hornsund Fjord, Spitsbergen.**—*Author's abstract.*

12.1–84 551.510.72

Anderson, Ernest C. (*Los Alamos Sci. Lab. of the Univ. of Calif.*), **Radioactivity of people and milk: 1957.** *Science*, N. Y., 128(3329):882–886, Oct. 17, **1958.** 9 figs., table, 15 refs. **DLC**—The routine determination of cesium-137 and potassium-40 content of over 2200 samples was accomplished through utilization of one-fifth of the potential capacity of the Los Alamos human counter. Little change in the cesium-137 concentration in people was observed from 1956 to 1957, in spite of the increase in both the rate and the integrated levels of fallout. The correlation of levels in human beings with cesium levels in milk indicates a discrimination factor of 1.8 in this step of the ecological transfer. Precipitation is shown to be an important factor determining the cesium content of milk, but the lack of complete correlation indicates that a more detailed analysis is necessary. Contamination of the troposphere during periods of weapon testing complicates the interpretation, as do seasonal variations. *Subject Headings:* **1. Radioactivity in humans 2. Radioactive milk.**—*Author's abstract.*

12.1–85 551.510.74:631.41

Gustafson, Philip F. (*Argonne Nat. Lab. Lemont, Ill.*), **Ratio of Cesium-137 and Strontium-90 radioactivity in soil.** *Science*, Wash., D. C., 130(3386):1404–1405, Nov. 20, **1959.** table, 13 refs. **DLC**—The similarity in genesis and the more pertinent physical characteristics of fission-produced Cs^{137} and Sr^{90} suggests the use of the first as a convenient monitor for the other prior to uptake in the biosphere. Results are presented which indicate the feasibility of this approach in the case of soils. *Subject Heading:* **1. Radioactive soil.**—*Author's abstract.*

12.1–86 551.510.7:63

Barbier, G., Huguet, F., Michon, G. and Tyszkiewicz, E., **Sur la prévision de l'accumulation, dans le sol et dans les récoltes, d'éléments radioactifs de longue période apportés indéfiniment à un rythme limité.** [On the prediction of the accumulation in soil and crops of long lived radioactive elements deposited indefinitely at a limited rate.] *Académie d'Agriculture de France, Paris, Comptes Rendus*, 44(18):874–880, Dec. 10 and 17, **1958.** 2 refs. **DLC**—Account of experiments carried out with a view to determine the contamination of crops by absorption of radioelements from the soil. For determining the quantity of radioelements absorbed by successive crops, vegetables were irrigated with water containing traces of radioelements. From the products of uranium fission, only strontium 90 and cesium 137 are examined. The experiments take no account of radioactive fallout. During the first year, each of the three successive crops showed, for the whole of the aerial parts, less than 1% of the quantity of radioelements applied from the outset until each yield, 0.52% for Sr^{90} and 0.42% for Cs^{137}. Relying on the unalterable law of spontaneous decrease of a radioelement, on the known results of tests and with the help of data taken from the science of soil and general agronomy, the authors attempted to foresee the course of the accumulation of radioelements in soil and yields, supposing that there would be an indefinite supply of them. *Subject Headings:* **1. Natural radioactivity 2. Artificial radioactivity 3. Radioactive accumulation in soil 4. Forecasting radioactive accumulation.**—*A.V.*

12.1–87 551.510.721:551.509.58

*Nagler, Kenneth M.; Machta, Lester and Pooler, Francis, Jr., **Method of fallout prediction for tower bursts at the Nevada Test site.** Wash., D. C., U. S. Weather Bureau, Special

Projects Section, Scientific Services Div., June **1955.** 34 p. 16 figs. (fold.), 11 tables. Photostat of typescript. **DWB** (M10.721 N149me)—Seven series of maps on the Snapper Tumbler and Upshot-Knothole test shots conducted at the Nevada Test Site in May and June 1952 and March–May 1953 are presented. A hypothetical plot shows the infinite dosages of fall-out in roentgens for points in various ranges of height and particle size. Errors in the fallout plot are discussed; the factors that affect the prediction are winds, cloud height and yield. Forecast heights of cloud are to the nearest 2500 ft, at the 40,000–42,500 ft levels. Special models for cases of little directional shear and for low yield tower bursts (5 and 10 kilo-tons) are considered also. *Subject Headings:* **1. Radioactive fallout forecasting 2. A.E.C. test site, Nevada.** —*N.N.*

12.1–88 **551.501:551.508.9:551.510.721**

Richter, A., **Fallout predictor.** Ford Instrument Co. Long Island City, Contract DA-36-039-sc-78185, Quarterly Report No. 1, July 1–Sept. 30, **1958.** 53 p. illus. (Original unchecked) (ASTIA AD-208 066)—The preliminary results of a study to determine the basis for the design of a device for predicting the fallout pattern of the debris from a nuclear bomb explosion are presented. The formulas of SUTTON and MACHTA for computing the height to which the cloud will rise are discussed as well as the variability of entrainment of air into the cloud as discussed by STOMMEL. Consideration of heat radiation and variable entrainment rate will improve the accuracy of these relations. The concepts needed for the development of a transport function are discussed. Relations for the fall of particle or group of particles at a constant velocity through a wind field are developed. Other relations are developed for particles falling with a variable velocity. A disc falling through a wind field and subject to shear is found to have a final shape dependent only on the velocity of the wind in which it is formed. The principles of operation of the NBS predictor are discussed and flow charts for programming a digital computer for the NBS method and improved methods of computation are presented. *Subject Headings:* **1. Radioactive fallout pattern forecasting 2. Fallout predictor.**—*TAB abstract.*

B6. INDUSTRY

See also: **Road traffic** (King), 12.1–73; **Weather and traffic** (Baumgärtner et al.), 12.1–74; **Ind. waste waters, Birzava River** (Săndulescu et al.), 12.1–211; **Wind load on structures** (Savitskiĭ), 12.1–348; **Wind load on structures** (Sherlock), 12.1-349; **Wind load on structures** (Woodruff, Kozak), 12.1–350.

12.1–89 **551.556.6:551.578.46:728.1**

Dorey, D. B. and Schriever, W. R. (*both, Natl. Res. Council of Canada, Div. of Building Res.*), **Structural test of a house under simulated wind and snow loads.** "Authorized reprint from Symposium on Full-Scale Tests on House Structures, Special Technical Publication, No. 210, pub. by American Society for Testing Materials, 1957." p. 29–49. 17 figs., 16 refs. **DWB**—A 24′×36′ wooden test house was adapted for simulated wind and snow load tests. During those tests in the summer of 1954 it was found that the design was adequate for 90 mph wind velocities (although a crack appeared on a repeated 90 mph load and further cracks when load was increased to 120 mph). Lateral movement under this load was less than 0.12″ and largest measured deflection at rafters was 0.31″ outward at midspan. The greatest deflection in rafters for 120 mph was 0.80″ and of exterior walls 0.08″ under snow loads. The wind loading effects decreased as wind increased. Failure of roof under snow loads of 143% of design snow load of 50 lb (sq ft) occurred. Under 100% snow load the rafters deflected 1.72″ on front slope and 0.55″ on rear slope, or 182% of the allowable deflector and under 143% design snow load the deflection reached 3.87″. At 75% of design snow load interior damage occurred and increased as load increased. By altering the roof, 175% of design snow load was reached before failure and further alterations raised it to 206%. Construction and testing details are given. Work was done to Ottawa. *Subject Headings:* **1. Wind load on houses 2. Snow load on houses 3. Wooden houses 4. Ottawa, Canada.**—*M.R.*

12.1–90 **551.556.6:69 532.5:69:551.588.7**

Weston, E. T., **Air movement in industrial buildings: effects of nearby buildings.** *Sydney, Australia. Experimental Building Station, Special Report,* No. 19, May **1956.** 36 p. 9 figs., tables, 2 refs. **DWB** (M:690 A938s)—Engineering information on effect of various shapes nd sizes of buildings on airflow over and around them, and over and around buildings in the ee or beside other buildings, for heating and ventilating design and calculation. It was found y model and field tests with smoke that the shape of the roof has as much effect as the height f the structure; for a single pitched roof 26 feet high and a curved roof building 31 ft high, he effect on smoke was felt to 60 to 65 ft in the former case and only 45 ft in the latter. Results especting height, distance of separation, etc. are complicated. Difference between separated nd connected buildings is also considered. Results are tabulated as well as discussed in outline orm. *Subject Headings:* **1. Building effects on wind 2. Air flow around buildings.** *M.R.*

12.1–91 551.556.1:625.5

La funivia del Monte Bianco e la meteorologia. [The Mont Blanc funicular and me- eorology.] *Geofisica e Meteorologia*, Genoa, 6(1/2):23, April **1958.**—This funicular between ourmayeur and Chamonix has proven to be easily damaged by winds not exceptionally trong for the locality. Winds of 100 km/hr forced the suspension of the service. In connec- ion with this miscalculation in construction it is pointed out that engineers and technicians requently ignore meteorological factors. In France the transportation of passengers on uniculars is limited by a wind velocity of 50 km/hr. For many years the Italian Society for eophysics and Meteorology has pleaded for a National Commission for Geophysics and leteorology having the authority to establish by means of suitable technical standards the miting conditions for exceptional phenomena or natural calamities. *Subject Headings:* **. Wind damage to funiculars 2. Funicular railways 3. Mont Blanc, France.** —*I.L.D.*

12.1–92 551.551:551.524:551.511.13:677.06

Powers, James J. and Botsch, Francis W., **Apparent thermal diffusivity of fabrics.** *U. S. uartermaster Research and Engineering Center. Environmental Protection Research Div., echnical Report, EP*-126, Feb. **1960.** 18 p. 4 figs., 2 tables, 7 refs., eqs. **DWB** (M86 585t)—The concept of thermal diffusivity is applied to fabrics and fabric systems in order provide a parameter for the mathematical analysis of the thermal response of clothing to onuniform boundary conditions. Particular solutions of the Fourier Conduction Equation r unidimensional heat flow are discussed for a thick slab of cloth and for a semi-infinite solid mposed of fabric layers. Four experimental methods are applied in the determination of e apparent thermal diffusivity of cloth, using boundary step changes and periodic variations temperature. The apparent thermal diffusivity of blanket cloth was found to be .0225 . 2/min and that of nylon 66 to be .0030 in. 2/min. *Subject Headings:* **1. Thermal diffusivity . Fabrics.**—*Authors' abstract.*

12.1–93 551.556.6:551.501.3

*†Singell, Thomas W., **Wind forces on structures: forces on enclosed structures.** *American ociety of Civil Engineers. Structural Div., Journal*, Vol. 84, Paper 1710, July **1958.** 24 p. figs., 2 tables, 46 refs. **DWP (P)**—The Committee on Wind Forces has analyzed the past ork, the present investigations and the correlation of the data that related to the shape efficient for the various building structures. Included are the tables from the Swiss Building ode which is the latest and most extensive data ever published. *Subject Headings:* **1. Wind fects on buildings 2. Wind force data.**—*N.N.*

12.1–94 623.55:551.510.3:551.557:531.5

Moorman, Thomas S., **Case study of applied meteorology.** *National Conference on pplied Meteorology, Hartford, Conn., Oct. 1957, Proceedings*, issued **1957.** Section A:1–7. refs. **DWB** (M A512pro)—As an example of the type of problems confronting the U. S. ir Weather Service a case is described in which it was necessary to determine whether it ould be justified to equip an anti-aircraft system with an expensive 9-level ballistic me- orological corrector which computes density and wind corrections for 9 separate levels within e weapons altitude range in preference to the average-level corrector in current use. *ubject Headings:* **1. Ballistic meteorological correctors 2. Ballistic density 3. Ballistic ind corrections.**—*G.T.*

12.1–95 551.509.58:662.76:621.6.02

Murray, John R. and Trettel, Dennis W. (*both, consulting Meteorologists Skokie, Ill.*), **Meteorology as a factor in gas-load dispatching.** *National Conference on Applied Meteorology, Hartford, Conn., Oct. 1957, Proceedings*, issued **1957.** Section B:23–30. fig. **DWB** (M A512pro)—The important task of gas dispatchers to "sell the right amount of gas to the right customer at the right time" and the type of assistance they expect from meteorologists are explained. Effects of weather factors (temperature, wind, cloudiness and precipitation) are briefly discussed. *Subject Headings:* **1. Gas consumption forecasts 2. Gas distribution.** —*G.T.*

12.1–96 551.58:551.574.42:621.311.24

Muretov, N. S., **Ispol'novanie klimatologicheskikh dannykh pri proektirovanii i ekspluatatsii linii elektroperedachi.** [The use of climatic data in planning and using electric power lines.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:35 38, Feb. **1959.** 3 figs., eq. **DWB, DLC**—With a view to considering meteorological conditions in constructing electrical transmission lines in the U.S.S.R., extensive climatological data on icing, minimum temperatures and winds were collected. The relationships between the large and small diameters of hoar frost deposits on wires indicated that on the average the small diameter (c) of the oval is $\frac{3}{4}$ of the large one (a), this holds for all types of hoar frost deposits up to 20 mm; for deposits exceeding 20 mm the equation is $c=0.16a+8$. The determination of a wall (b) equal in weight to a cylindrical deposit with a specific weight of 0.90 attained by

$$b=\frac{D-d}{2}=\frac{\sqrt{(ac-d^2)\frac{\gamma'}{\gamma}+d^2}-d}{2}$$

where D = large diameter of deposit together with line, d = diameter of the line suspended on the weather station installations, γ = specific weight of pure hoar frost i.e., 0.90, γ' = specific weight of each icing type. The author discusses coefficients of transition from hoar frost deposits of weather stations to loads on transmission lines, the construction of probability curves of hoar frost deposits of various thickness, establishment of regions with intense winds, frequency of absolute temperature minima, thunderstorm occurrence, etc. *Subject Headings:* **1. Icing of transmission lines 2. Climatic data for planning electric power lines 3. U.S.S.R.** —*I.L.D.*

12.1–97 551.5:697.8

Buffault, L., **Influences météorologiques sur le tirage des conduits de fumée.** [Meteorological influences on the working of smoke flues.] *La Météorologie*, Paris, Ser. 4, No. 52:271–274, Oct./Dec. **1958.** 4 figs. French, English and Spanish summaries p. 271. **DWB**—The author examines the influence of the temperature of the air, of the wind—direction and speed—also occasionally, of the precipitation, on the working of smoke flues. A graph shows, in terms of external temperature (°C), the difference of pressure power Δp (mb), which provokes the circulation of gases in the smoke flue for different values of θ_B, mean temperature of burnt gases in the flue. It is shown that $\Delta p=h\rho g(\delta_A-\delta_B)$, where: h = height of the flue; ρ = specific mass of the air supposed to be free from water vapor, at 0°C and 1013, 2 mb; g = gravitation attraction; δ_A = air density at a temperature θ_A; δ_B = density of burnt gases at a temperature θ_B. Likewise, a graph gives the depression Δp in terms of wind speed. Quantitative estimation tests are being conducted with the sole aim—due to complexity of real cases—of being able to appreciate the respective orders of quantity of influences under consideration. *Subject Heading:* **1. Stack meteorology.**—*A.V. and author's abstract.*

B7. RADIO COMMUNICATION

12.1–98 551.510.62:551.510.52:621.396.1

Broussaud, G; Malnar, L. and Baud, R., **I. Prototype de transmission multiplex par diffusion troposphérique; II. Amplificateur 10 kW dans la bande des 2000 MHz.** [I. A prototype of multiple tropospheric scatter propagation; II. Ten kw amplifier operating at 2000 Mc/s.] *L'Onde Electrique*, Paris, 40(394):83-99, Jan. **1960.** 31 figs., eqs. French and English summaries. **DLC**—The development of a prototype 2000 Mc/s over the horizon radio-link equipment is described. The principal characteristics of the equipment are: power 10 kW, 12 m diameter parabolic reflectors, frequency diversity, 36 telephone channels, frequency modulation. After considering the general criteria which determined the choice of characteristics, the most important features of the development are examined and in particular certain interesting wave-guide sections are described and, finally, the power amplifier is discussed. *Subject Headings:* **1. Tropospheric radio wave propagation 2. Radio wave transmission.**—*Authors' abstract.*

12.1–99 551.510.62:621.396

Boithias, L. and du Castel, F., **Etude d'un faisceau hertzien transhorizon en Afrique Occidentale.** [Study of an over the horizon radio beam in West Africa.] *L'Onde Electrique*, Paris, 40(394):39–45, Jan. **1960.** 15 figs., 9 refs. French and English summaries. **DLC** – Propagation tests at 100 and 430 Mc/s have been carried out by the "Centre National d'Etudes des Telecommunications" between Dakar and Conakry from November 1957 to April 1958. The systems studied were 270, 280 and 170 km in length. The results obtained were examined from the point of view of the variation in the mean loss. An important diurnal effect was noted. A correlation between the monthly variations in propagation loss and a parameter and the climatic conditions of the region concerned, is attempted. The study included the variations of 3 parameters, the refractive index at ground, the mean gradient index defined by the values of the index at the surface and at the altitude of 1000 m, the stability of the lower atmospheric layers and the vapor tension at the surface. The annual variations of radio meteorological parameters are very different and therefore it is difficult to select the most favorable season for propagation. It seems that in tropical regions the radiometeorological parameters comply with more complex laws than in temperate climates. The index gradient is probably the most suitable parameter. It is therefore, concluded that from December to February would be the worst period. The variations of signal strength are then examined. The analysis of the amplitude yields information on the characteristic laws, while the analysis of duration provides other interesting information. The results are used to design an over the horizon project between Dakar and Conakry. Some general inferences are drawn on the influence of a tropical region of UHF over the horizon propagation. *Subject Headings:* **1. Radio communication 2. Refractive index variations 3. Refractive index gradient 4. Radio meteorology parameters 5. French West Africa.** —*A.V. and authors' abstract.*

12.1–100 551.510.62:551.551:621.396.11

†Voge, J., **Réflexions partielles dans l'atmosphère et propagation à grande distance, IV, Réflexion spéculaire et réflexion diffuse sur des feuillers atmosphériques.** [Partial reflections in the atmosphere and long-range propagation, Pt. 4, Specular reflection and scattered reflection from atmospheric layers.] *Annales des Télécommunications*, Paris, 15(1/2) 33–47, Jan./Feb. **1960.** 7 figs., 20 refs., eqs. **DLC**—After discussing the principles of existing theories (diffusion and partial reflections) on the propagation of ultra-short waves at great distance, the authors emphasize the necessity to distinguish between the "space" and "time" variables and to consider the instantaneous characteristics of the received signal. They also discuss the data concerning the splitting up of the atmosphere and establish formulas permitting to compute the power reflected on a layer with a regular surface, and with an irregular surface. The authors hypothesize that the irregularities of the surface of the layer may be due to atmospheric turbulence, showing a connection between the phenomena of reflection and turbulence. The formulas will be employed in a future paper to calculate the characteristics of the signal strength. The authors then give an account of the results which lead them to distinguish between three types of propagation (specular reflection, diffused reflection, diffusion in an important volume of the atmosphere) with a possibility of progressive transition from the one to the other when frequency increases. The three mechanisms may theoretically intervene simultaneously according to frequency, with a progressive transition from the first to the latter when the wave length is lowered. *Subject Headings:* **1. Tropospheric reflection 2. Reflecting**

layer height 3. Refractive index variations 4. Turbulence effects on ultrashort radio wave propagation.—*A.V.*

12.1–101 551.510.62:551.510.52:551.588.2:621.396.1

du Castel, F., **Les faisceaux hertziens transhorizon, situation actuelle et avenir.** [Over the horizon radio links, present and future position.] *L'Onde Electrique*, Paris, 40(394):9–18, Jan. **1960.** 16 figs., 14 refs. French and English summaries. **DLC**—The author first reviews the principal knowledge on over the horizon transmission with ultrashort waves: the propagation loss observed in a number of practical cases, the characteristics of fluctuations, theoretical interpretation of the propagation phenomenon, and then he shows practical means of approximately evaluating the loss of a given system. The considered cases relate to transmissions over various distances from 300 up to 500 km. Figures reproduce the linking characteristics and the damping distribution. The experimental results are likely to confirm the interpretation that the propagation is a phenomenon of partial reflection on the more or less stratified irregularities of the atmosphere. The reflection of the incident radiation may have very different values owing to the variation of the reflective index with the nature of the atmospheric irregularities. The influences of climate and relief appear to play an important part in the propagation losses. The author then considers the basic factors controlling the design of such an over the horizon radio link, and the method of determining the quality for telephone and telegraphic transmission. Finally, he discusses the performance which is obtained and is likely to be obtained with present and future links for multiplex over the horizon systems. Satellites seem to be the coming solution for transmission over very great distances as the reflected beams may prolong the over the horizon links. *Subject Headings:* **1. Radio communication 2. Tropospheric radio wave propagation 3. Refractive index variations.**—*A.V. and author's abstract.*

12.1–102 551.510.62:551.510.52:621.396

Dockes, J. and Koreicho, W., **Liaisons hertziennes transhorizon dans la gamme 4400–5000 MHz.** [Over the horizon radio link systems in the 4400–5000 Mc/s band.] *L'Onde Electrique*, Paris, 40(394):100–105, Jan. **1960.** 8 figs., 5 refs. French and English summaries. **DLC**—The article reviews the general information available on tropospheric propagation in the neighborhood of 4500 Mc/s and establishes the basis for calculating the principal transmission characteristics of a given system. A general description is then given of equipment operating in the 4400–4500 Mc/s ranges. *Subject Headings:* **1. Tropospheric radio wave propagation 2. Radio transmission loss.**—*Authors' abstract.*

12.1–103 551.510.62:621.397.5

Laurens, A.; Koenig, J. D. and Carzan, C., **Essais de transmission au-delà de l'horizon d'images de télévision à 4000 MHz.** [Over the horizon transmission of television signals at 4000 MHz.] *L'Onde Electrique*, Paris, 40(394):106–111, Jan. **1960.** 11 figs., table, 3 refs. French and English summaries. **DLC**—The authors first compare 800 and 4000 Mc/s frequencies for over the horizon transmission of television signals, particularly from the point of view of signal to noise and bandwidth obtained. They then describe an experimental system operating at 4000 Mc/s over a distance of 220 km. Finally, they discuss the results obtained and analyse the recordings made. *Subject Headings:* **1. Over the horizon transmission of television signals 2. Television signal transmission.**—*Authors' abstract.*

12.1–104 551.510.62:621.396

Misme, P., **Influences radioclimatiques sur les liaisons transhorizon.** [Influence of radioclimatic conditions on over the horizon links.] *L'Onde Electrique*, Paris, 40(394):116–123, Jan. **1960.** 13 figs., 3 tables, 13 refs. French and English summaries. **DLC**—The author begins with the radioclimatic effects on over the horizon propagation, and on the interference that a transmitter may produce on an existing system. He then develops the idea of the useful gradient of the refractive index and shows that this parameter is more representative of the atmosphere than the difference between the indices at levels of zero and 1000 m. The forms which are taken by the refractive index as a function of height are considered theoretically and experimentally, and it is shown that this is not an exponential function. The form is quasi-exponential within following regions: 1°) the polar caps, extended to the zones, where or a great percentage of days in each month the soil temperature is lower than 14°C; 2°) the emperate zones during winter; 3°) the deserts, hot during daytime; 4°) the altitudes higher han the surface $s=10$ g/kg (s=specific humidity); 5°) certain temperate zones during the vhole year. One can consequently determine *a priori*, when in more than half of the globe he index gradient at a place is a function of the refractive index at the same spot. From this t is deduced that a good correlation between the refractive index and its gradient is not likely o exist in the lower atmosphere layers. This article also calls attention to other important adioclimatic parameters which are still little studied, for example the stability of the atnosphere. *Subject Headings:* **1. Refractive index variations 2. Radiometeorology parameters . Refractive index gradient.**—*A.V. and author's abstract.*

C. ASTRONOMY AND ASTROPHYSICS

1. ASTRONOMY

12.1–105 551.593.12 551.510.62:621.396.1

Scheffler, H. (*Potsdam*), **Zur Berücksichtigung der Mehrfachstreuung in der Theorie ler Szintillation optischer und radiofrequenter Strahlung.** [Consideration of multiple cattering in the scintillation theory of optical and radio frequency radiation.] *Astronomische Vachrichten*, Berlin, 284(1):21–23, July **1957.** 12 refs., 7 eqs. **DLC**—Connections between ecent theories of ELLISON, OBUKHOV, KELLER, FEJER and the author on the scattering of lectromagnetic waves in a medium with statistically distributed refractive index variations re discussed in regard to the consideration of multiple scattering. *Subject Headings:* **1. Radio requency radiation 2. Electromagnetic wave scattering 3. Scintillation.**—*Transl. of author's bstract.*

12.1–106 551.5:52:061.1(85)

Roldan Seminario, Ernesto, **La astronomia y la meteorologia.** [Astronomy and meteorlogy.] *Revista Meteorológica del Peru*, Lima, 3(6):25–26, **1957. DWB**—Relationship etween astronomy and meteorology in historic times and at present (sunspot effects upon veather elements and the dependence of astronomical visibility upon weather conditions) are liscussed in this summary of a lecture. It includes a brief description of the Peruvian Meeorological Service which now maintains 17 stations reporting hourly, 59 thrice daily (at even of these pilot balloon launchings take place), 163 reporting at the end of each month nd finally 7000 police stations cooperating in cloudiness reports. The Meteorological Service naintains a close contact with the Astronomical Association of Peru. *Subject Headings:* **. Meteorology-astronomy relationships 2. Peruvian Meteorological Service.**—*G.T.*

12.1–107 523.7:551.510.535:550.3:061.3

Waldmeier, M., **Die Astronomie im Geophysikalischen Jahr.** [Astronomy during the Geophysical Year.] *Die Sterne*, Leipzig, 34(3/4):45–56, **1958.** 4 figs. **DLC**—The author hows the progress made after the Polar Years of 1882/83 and 1932/33. The geophysical ear starting on 30/6/1957 has an extended objective and the scientists today are well equipped nd have more facilities. However, the principal objective is the research in the field of onosphere. In 1939 we had only 4 research stations; today the scientists have at their disposal a hundred stations, spread over the Northern Hemisphere, and mostly concentrated in America and Europe. With radiowaves it is not only possible to carry out ionosphere reearches but also terrestrial magnetism, and aurora. Other aspects of ionospheric phenomena re to be observed during the Geophysical Year. A geophysical year must be a "solar year." The author outlines the program in the field of solar observations: photosphere, chromosphere nd corona. *Subject Headings:* **1. Ionosphere 2. Solar observations 3. IGY program.**—*A.V.*

C2. ASTROPHYSICS

12.1–108 535.33

†Astoin, N.; Romand, J. and Vodar, B. (*all, Natl. Center for Sci. Res., Bellevue, France*), **Recent data on the 'vacuum sliding spark' spectrum and its use for absorption spectropho-**

tometry in the far ultraviolet. (In: **The threshold of space,** ed. by M. Zelikoff. N. Y. Pergamon Press, **1957.** p. 128–135. 9 figs., table, 30 refs.) **DLC**—The "vacuum sliding spark" method provides the practical possibility of obtaining the strongly excited and ionized states which should exist in the highest levels of the atmosphere. A number of spectrograms illustrate the method, originally introduced by the authors in 1950, with its further development and refinements. Both are discussed. The sliding spark is created in a vacuum between two electrodes connected by an insulator with a small opening. *Subject Heading:* **1. Spectrographic methods.**—*A.A.*

12.1–109 523.77:535.33

ten Bruggencate, Paul; Lüst-Kulka, Rhea and Voigt, Hans Heinrich, **Methodisches zur Berechnung von Fraunhoferlinien im Sonnenspektrum.** [Methods of calculation of lines in the solar spectrum.] *Akademie der Wissenschaften zu Göttingen. Math.-Physik. Klasse, IIa, Math.-Physik.-Chem. Abteilung, Nachrichten,* No. 3, **1955.** 69 p. 10 figs., 2 tables, 18 refs., 38 eqs. **DLC**—A thorough discussion, based on theory and observation, of the problem of the depth, width, intensity of solar spectral lines, their variation over the solar disc and methods of measuring, calculating and interpreting these lines. *Subject Headings:* **1. Astrophysics 2. Solar spectrum.**—*M.R.*

12.1–110 621.396.8:523.8

Gadomski, Jan (*Observatory, Warsaw*), **Die Sternenökosphären im Radius von 17 Lichtjahren um die Sonne.** [Star ecospheres within a radius of 17 light-years around the sun.] *International Astronautical Congress, Proceedings of the 8th Congress, Barcelona, 1957,* issued Vienna, **1958.** p. 127–136. fig., 4 tables, 11 eqs. German, English and French summaries p. 127. **DLC** (TL787.I44)—The range of the ecospheres of those stars is calculated that are situated in the neighborhood of the Sun within a radius of 17 light-years. Using certain formulas and VAN DE KAMP'S catalogue the author has made up a list of 59 star ecospheres. Being somewhat uncertain, the values of the calculated radii and of the masses of the stars are rounded off. It follows that only 16 stars which are similar to the Sun show broad ecospheres (about 200 × 10^6 km) and can possess only planets with stopped rotation periods, i.e. with very limited ecological possibilities. *Subject Heading:* **1. Star ecospheres.** –*Author's abstract.*

C3. ASTROPHYSICAL INSTRUMENTS

12.1–111 523.77 778.3:535.243

†Robin, Simone and Robin, Stéphane, **Spectrographe à réseau pour l'ultraviolet lointain: application à l'étude des perturbations par la pression des raies de résonance du mercure.** [Diffraction-grating spectrograph for the far ultraviolet: application to the study of disturbances through the pressure of the resonance rays of the mercury.] *Revue d'Optique,* Paris, 37(4):161–187, April **1958.** 27 figs., 2 tables, 28 refs. French and English summaries p. 161. **DLC**—A concave grating spectrograph with one meter radius of curvature at normal incidence for use in the far ultraviolet is described, including all facilities required for absorption measurements. The equipment has been used for measuring perturbations of 1850 Å resonance line of mercury as due to pure mercury vapour and to extraneous gases (H_2, N_2, He, A, Xe) under pressures up to hundreds of atmospheres. The study of satellite bands of the 1850 Å line in absorption and emission spectra was carried out in presence of rare gases. Incidentally, the perturbations of the 2537 Å line due to xenon under pressure were measured and their satellite bands in emission spectrum were found again in presence of rare gases. *Subject Heading:* **1. Far ultraviolet spectrographs.**—*Authors' abstract.*

12.1–112 523.77

Laborde, G.; Michard, R. and Servajean, R. (*all, Observatoire de Paris-Meudon*), **Premières observations avec le spectrographe solaire de 9 mètres.** [First observations with the solar spectrograph of 9 m.] *Annales d'Astrophysique,* Paris, 20(6):209–221, Nov./Dec. **1957.** 4 figs., table, 6 refs. French, English and Russian summaries p. 209. **DWB, DLC**—The new solar spectrograph, in operation at Meudon since the summer 1956, is described. The plane

180 mm grating can be used efficiently both in low orders on one side of the normal, and in high orders on the other side. This allows various possibilities for the instrument. We give the spectrograph performances, pointing out practical performances in current work. In 1956, the observations with the new instrument had chiefly an exploratory character, with a view to ascertain its possibilities and to devise suitable technics for the study of the following questions: spectrophotometry of sunspots, detailed measurements of sunspots magnetic fields, local Doppler shifts associated with sunspots and the photospheric or chromospheric structure. These problems are briefly discussed and some qualitative results are described. Particularly we give preliminary results on the variation with height of the Hα profile from single chromospheric spicules. *Subject Headings:* **1. Solar spectrographs 2. Meudon, France.**—*Authors' abstract.*

C4. SUN

See also: **Solar spectrum** (ten Bruggencate et al.), **12.1–109.**

12.1–113 523.164.82:621.396.96

Tanaka, Haruo; Kakinuma, Takakiyo; Jindo, Hidehiko and Takayanagi, Toshio, **Equipment for the observation of solar noise at 3,750 MC.** *Nagoya. University. Research Institute of Atmospherics, Proceedings,* 1:71–85, Jan. **1953.** 23 figs., 2 photos, 5 refs., eqs. **DWB**—Equipment for measuring 8 cm radio waves from the sun (solar noise) was designed by the authors in 1950 and tested by actual observations for 600 hrs in 1951, then modified and used for systematic observations from Nov. 1951 through 1952 with alterations in Aug. 1952. The method is similar to that of R. H. Dicke (1946). Details of construction of aerials, modulator, balanced frequency converter, amplifiers, synchronous rectifiers, output, power supply, signal generator and calibrations are given in text and illustrations. Theoretical calculations of output fluctuations also given. *Subject Headings:* **1. Solar radio noise equipment 2. Solar radio noise measurement.**—*M.R.*

12.1–114 523.164.82:621.396.96

Tanaka, Haruo and Kakinuma, Takakiyo, **Equipment under construction for locating sources of solar noise at 4,000 MC.** *Nagoya. University. Research Institute of Atmospherics, Proceedings,* 1:89, Jan. **1953.** photo. **DWB**—An interferometer with 5 aerials was constructed beginning in May 1952. Aerials are placed at 6 m intervals in an E-W direction. Test observations were to be performed in April 1953, by scanning the sun "stripwise as it passes through the aerial pattern." *Subject Headings:* **1. Solar radio noise equipment 2. Antennas.**—*M.R.*

12.1–115 523..75 551.521.67

†Mustel', E. R., **Obsuzhdenie vozmozhnykh istochnikov geoaktivnykh korpuskul v obolochke solntsa.** [Discussion of the possible sources of geoactive corpuscles in the solar envelope.] (In: Akademiia Nauk SSSR. Komissiia po Issledovaniiu Solntsa, **Fizika solnechnykh korpuskuliarnykh potokov i ikh vozdeĭstvie na verkhniuiu atmosferu zemli.** Moscow, **1957.** p. 8–39. 22 figs., table, 36 refs.) **DLC** (QB531.A5). Transl. into English by John Miller and Judith Danner issued by American Meteorological Society under Contract AF 19(604)-1936 as its Translation T-RC-13+, (1959). p. 1–56.—A general review of methods of research on corpuscular currents from the sun and present knowledge of sunspots, faculae and flocculae, chromospheric eruptions, radial structure of corpuscular currents, effects on and of magnetic fields, solar protuberances, sun's corona, various sources of corpuscular currents, speed of atoms in currents and concentration of atoms in currents. Examples are given in graphic form. *Subject Headings:* **1. Sources of solar corpuscles 2. Solar eruptions 3. Solar corpuscular currents.**—*M.R.*

12.1–116 551.521.67:551.510.535:621.396.8

Friedman, H. and Chubb, T. A., **Solar X-ray emission and the height of the D layer during radio fade-out.** (In: Physical Society of London, **Physics of the ionosphere.** London, **1955.** p. 58–62.) table, 14 refs. **DWB** (M10.535 C748)—Rocket measurements show that Lyman alpha radiation of hydrogen is the major source of ionization in normal D layer and that solar X-rays contribute to the uppermost portions. Evidence exists that X-rays as short as 1–2 Å together with enhanced Lyman alpha radiation are generated during a solar flare. The largest flares are accompanied by sudden phase anomalies which indicate a lowering of the reflecting ceiling for long waves by as much as 15 km. To produce the necessary ionization at the lower levels L_χ intensity would need to increase by 10^4 during the flare, reaching a peak value of 10^3 erg cm^{-2} sec^{-1}. An X-ray flux of only 10^{-5} erg cm^{-2} sec^{-1} would form the required reflecting layer at 60 km. *Subject Headings:* **1. Solar X-ray emission 2. D layer height.** —*Authors' abstract.*

12.1–117 523.747:551.521.64:551.510.535:551.594.12

Malurkar, S. L. (*Colaba Obs., Bombay*), **Solar control of some unusually remarkable geophysical events.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 17(12), Special Supplement, Dec. **1958.** p. 69–71. table, 6 refs. **DWB, DLC**—The brief discussion deals with major solar active regions and associated phenomena tabulated. The conclusion drawn is: two small longitudinal sectors, one near the western limb, the other near CM of the sun are where the flares causing major geophysical events are located. Only flares from these regions of long and active history give rise to the unusually stepped up cosmic ray bursts. The western limb of the sun is where the solar flares and the subsequent stepped up cosmic activity originate, and also the increase of electron density in the F2 region. *Subject Headings:* **1. Solar flare effects on cosmic radiation 2. Solar-ionospheric relationships 3. Solar-geophysical relationships.**—*W.N.*

12.1–118 523.746:551.524.37:551.577.33

Abbot, Charles G. (*Res. Assoc., Smithsonian Inst.*), **Weather and solar variation.** *Journal of Solar Energy Science and Engineering*, Phoenix, Ariz., 1(1):3–5, Jan. **1957.** 4 figs., 8 refs. **DWB, DLC**—The author discusses the amplitudes and periods in the variation of solar radiation and the possibility that variations in meteorological variables and in weather are produced by those variations in solar radiation, outlines his procedure for examining the possible correlation between solar changes and weather changes (computation of separate records of temperature and precipitation, for years above and below the average Wolf numbers, smoothing the average by 5 month convective means, etc.) and then compares forecasts for precipitation and temperature for St. Louis and Peoria, Ill., are compared graphically with the actual 5 month smoothed running means for the period 1954–1959. *Subject Headings:* **1. Solar radiation variations 2. Solar-weather relationships 3. Temperature variations 4. Precipitation variations 5. St. Louis, Mo. 6. Peoria, Ill.**—*I.L.D.*

12.1–119 551.590.21:523.746:551.583.13

Clough, H. W., **Some solar and related meteorological periods.** Reprint of 6 p. from *Popular Astronomy*, Northfield, Minn., 58(10), Dec. **1949.** fig., 3 tables, 7 refs. **DWB** (M:523.74 C647so)—This brief paper contains tabular and graphical data showing short and long periodicity of sunspot activity since 301 A.D. up through 1947. Short periodicity includes 3½ months, 9 months, 30 months and 11 years; long periodicity are of 37, 83, 300 and 1400 years. The meteorological variations due to sunspot are here considered as follows: The 3½ month variation shows up before onset of epochs of high pressure in the coastal regions of Alaska and British Columbia. The 9 months variation of solar spottedness is followed by low pressure in the western Canadian plains and has high pressure in the N.W. United States. Short intervals of the 30 month solar cycle occur near the Bruckner epochs of low temperature and excessive rainfall; longer intervals coincide with extreme warmth and dryness. St. Louis temperature since 1875 closely follows maximum and minimum spottedness of the northern solar hemisphere. *Subject Headings:* **1. Solar-weather relationships 2. Sunspot cycles 3. Periodicities.**—*W.N.*

12.1–120 523.755:535.247

Mädlow, Marlene (*Potsdam*), **Photometrie der Sonnenkorona vom 30. Juni 1954 im roten Spektralbereich.** [Photometry of the solar corona, June 30, 1954 in the red spectral region.] *Astronomische Nachrichtungen*, Berlin, 284(4):149–154, Oct. **1958.** 5 figs., table, 15 refs., 6 eqs. **DLC**—A photograph of the sun's corona, made on June 30, 1954 at 633 mμ effective wave length, is photometrically analyzed. A correction for atmospheric scattering is applied on the basis of brightness against the moon, by means of a scatter function derived from measurements of S. GÜNTHER. The results are compared with those of WALLENQUIST, ALLEN, WALDMEIER and BACHMANN and the coronal model of VAN DE HULST. *Subject Headings:* **1. Photometry of sun's corona 2. Sun's corona.**—*Transl. of author's abstract.*

12.1–121 551.590.21:551.513

†Vitel's, L. A., **Solnechnaia priroda atmosfernykh ritmov.** [Solar origin of atmospheric rhythms.] *Moscow. Tsentral'nyĭ Institut Prognozov,* Trudy, No. 51:22-43, **1957.** 13 figs., 26 refs. **DLC**—Relation of atmospheric processes with rhythmic solar activity is discussed on the basis of the study of 26 references. Coordination of data on meteorological and hydrological phenomena with repeated variations of solar activities are made with set of graphs, tables and maps with isallobaric center of the solar activities. The author also made special study of relation of fluctuation of intensity of anticyclones in the Azores Island and Western Europe, which are analogous to the North Atlantic system, but with different periods. The effects of various current synoptic processes were separated for certain periods of time by computation of the index of intensity of the anticyclonic circulation on the calendar days during many years. Further investigation is necessary, particularly for the study of active longitudes of sun and their evolution and also the study of auto-vibrating system in the atmosphere and determination of the effect of impulses of solar activities. *Subject Headings:* **1. Solar-weather relationships 2. Atmospheric circulation.**—*N.P.S.*

12.1–122 523.7:550.3:061.3

Mitropol'skaia, O. N., **Na stantsiiakh sluzhby Solntsa.** [At solar observation stations.] *Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu MGG, Informatsionnyĭ Biulleten',* No. 3:88–92, **1957.** fig., 3 refs. **DLC**—Contains information on expansions and modernization to be introduced in the existing solar observation stations that will operate during the IGY according to a unified program. Chromospheric-photospheric telescopes equipped with interference-polarization filters separating out the $H\alpha$ line in the study of chromospheric flashes, and photoelectric photometers designed by N. D. GLUKHOV for the measurement of chromospheric flashes, radiation energy, and radiation flows of hydrogen flocculus will be installed at all stations. Observations of the sun's corona are carried out at the mountain stations of the main astronomical observatory near Kislovodsk (2130 m altitude), and of the Kazakh Astrophysical Institute near Alma-Alta. Measurement of sun spot magnetic fields will be carried out during the IGY daily by the tower solar telescope of the Crimean Astrophysical Observatory. Solar radio emission will be registered by a series of stations daily. *Subject Headings:* **1. IGY solar activity program 2. Solar observatories.**—*A.M.P.*

C5. MOON

12.1–123 523.32

Jaeger, J. C. (*Res. School of Physical Sciences, Australian Natl. Univ., Canberra*), **The surface temperature of the moon.** *Australian Journal of Physics,* Melbourne, 6(1):10–21, March **1953.** 7 figs., 2 tables, refs., p. 21. **DLC**—Results of numerical calculations are given for (i) the fall in surface temperature during a lunar eclipse, (ii) the variation in surface temperature at the equator during a lunation, and (iii) the variation in microwave temperature at the equator during a surface by radiation according to the fourth power law. Two models are considered, firstly, that in which the surface material of the moon is homogeneous, and secondly, that in which it consists of a thin skin of poor conductor on a better conducting substratum. The experimental results are discussed in the light of these calculations and it is found that none of the proposed models fits them all adequately, and, though there is a slight preference for the thin skin model over the homogeneous solid, it is not possible to discriminate between the two on the information at present available. *Subject Headings:* **1. Lunar temperatures 2. Lunar eclipse effects.**—*Author's abstract.*

12.1–124 523.32

Öpik, E. J., **The density of the lunar atmosphere.** *Irish Astronomical Journal,* Armagh, 3(5):137–143, March **1955.** 7 refs., 8 eqs. **DLC.** Reprinted as *Armagh, Ireland. Observatory, Leaflet,* No. 29. **DWB**—Estimates of the density of the lunar atmosphere made from various criteria vary from 1/12,000 that of the terrestrial (LIPSKIĬ, 1953) to 1/1,300,000 that of the earth. Calculations by the author, using the surface brightness of the earth-shine at quarter phase, give a value of 1/226,000 that of the terrestrial for the mass, and probably "pressure or density of 1/1.3 million that of the earth." *Subject Headings:* **1. Lunar atmosphere 2. Lunar atmosphere density.**—*M.R.*

12.1–125 523.32:535.24

Orlova, N. S., **Fotometricheskiĭ rel'ef lunnoĭ poverkhnosti.** [Photometrical relief of the lunar surface.] *Astronomicheskiĭ Zhurnal, Moscow,* 33(1):93–100, Jan./Feb. **1956.** 4 figs., 2 tables, 12 refs. Russian and English summaries, p. 93. **DLC**—Respective measurements of the brightness of the lunar surface carried out by B. A. FEDORETS and the absolute measurements of brightness by N. N. SYTINSKAIA and V. V. SHARONOV were reduced. Supposing the surface of the continents and the surface of the seas as similar in all points of the lunar disc, average coefficients of brightness (brightness factor, albedo) were deduced for various combinations of the angles of incidence and reflection. Results related only with the plane of incidence of the solar rays for seas and continents are given in tables. If the obtained results are represented in the form of a polar diagram of reflectivity (diffusion function) then a group of curves is obtained, extremely extended in the direction to the sun at any angles of incidence of solar rays. Curves for the seas are similar to those for the continents. The similarity of the character of curves shows that the uneveness of the lunar surface is extreme and is the same for the seas and the continents. Diffusion diagram of the moon exceeds considerably the investigated terrestrial samples according to their extension. This shows that the surface of the moon is covered with extremely porous matter, resembling slags of a spongy structure. *Subject Heading:* **1. Lunar photometry.**—*Author's abstract.*

12.1–126 551.21:523.346

Richter, N., **Mondkraterformationen auf der Erde.** [Lunar crater structures on earth.] *Geofisica Pura e Applicata,* 20:15–23, July–Dec. **1951.** 7 figs., 4 refs. **DWB**—It is shown, that some terrestrial volcanic craters are known, the morphological structure of which is practically identical with the typical shapes of lunar craters. The importance of this relation for the problem of the origin of lunar craters is pointed out. It may be expected, that some more examples of this kind might be found. *Subject Headings:* **1. Lunar crater structures 2. Volcanic craters.**—*Author's abstract.*

12.1–127 523.746:523.38

Vassy, E. (*Faculté des Sciences de Paris*), **Interprétation de la loi de Danjon.** [Interpretation of the Danjon law.] *Journal Scientifique de la Météorologie,* Paris, 8(29):1–3, Jan./March **1956.** 2 figs., 8 refs. French, English and Spanish summaries p. 1. **DWB**—A discussion of the fact that the brightness and color of the eclipsed moon varies with the 11-year sunspot cycle, and that there is a discontinuity in the phenomenon at the time of a sunspot minimum—the brightness of the "ashy light" increasing to the time of sunspot minimum and then rapidly becomes darker immediately after passage of the minimum. Causes of this anomaly are discussed in terms of possible effect of increase in auroral activity, cloud amount or on refractive index. *Subject Headings:* **1. Danjon's law 2. Sunspot cycle-lunar eclipse brilliance relationships 3. Auroral activity.**—*M.R.*

C6. METEORS

See also: **Radio echoes from meteors** (Davies, Lovell), 12.1–223; **Meteor radiant determination** (Keay), 12.1–225; **Meteor dust** (Parkin, Hunter), 12.1–281.

12.1–128 551.501.81:551.590.25

Forsyth, P. A. (*Radio Physics Lab., Canadian Defence Research Board, Ottawa*), **Forward scattering from meteor trails.** *AGARDograph,* Paris, No. 26:1–6, July **1957.** **DWB** (629.1322 N864a)—Some physical characteristics of meteors are briefly reviewed. About 10^{10} meteoric particles are incident on the earth in a single day. The number N of particles with masses exceeding M is given by

$$N \alpha\, 1/M.$$

When a meteoric particle enters the region of the atmosphere between 80 and 120 km, an initially straight column of ionization is produced. Meteoric particles are concentrated towards the apex of the earth's way. This leads to diurnal and seasonal variation in meteoric rate. Meteor showers modify this variation. Two types of reflections from meteor trails occur. For electron line densities $q<10^{14}$ electrons/meter, the trails are transparent to radio waves and are termed underdense. For $q>10^{14}$ electrons/meter the trails reflect like metallic cylinders and are termed overdense. In both cases the reflections are specular. The maximum received power is proportional to q^2 and $q^{1/2}$ for underdense and overdense trails respectively. *Subject Headings:* **1. Radio wave scattering by meteor trails 2. Radio echoes from meteors.**—*Author's abstract.*

12.1–129 551.501.81:551.590.25

Forsyth, P. A., **Meteor signal characteristics of importance in communication.** *AGARDograph,* No. 26:7–14, July **1957.** eqs. **DWB** (629.1322 N864a) —Because of the specular character of the reflections from meteor trails, only a fraction are useful in communication. Various factors determining the number of useful trails as a function of position or orientation of the trail are discussed for isotropic incidence, and modifications caused by anisotropy are described. As sporadic meteors appear to arrive mostly from the apex of the earth's way, different diurnal variation for different path orientations results. Distribution of amplitude follows the same type of law as the mass distribution of meteor particles for underdense reflections, but is modified by the occurrence of overdense trails. The duration of the individual echoes is influenced by a number of effects. The height of reflection, and thus the duration of the echoes, varies over the day. Some echoes develop deep fading due to winds breaking the trails up. It is emphasized that the incidence rate of meteors shows very large fluctuations. Examples of experimentally obtained fluctuations and variations in average rate are presented. *Subject Headings:* **1. Radio echoes from meteors 2. Meteor trails.**—*Author's abstract.*

C7. COMETS

12.1–130 523.67:535.33(912)

*†Swings, P. and Haser, L., **Atlas of representative cometary spectra.** Liège. Université. Institut d'Astrophysique, Contract AF 61(514)-628, Technical Final Report, **(1956).** 37 p. of text. 23 plates. 5 figs., 20 tables, refs. at end of most tables. 50×43 cm.—An oversize atlas containing not only sample spectra from various comets (1911–1948) but corresponding data and textural notes on the general aspects of cometary spectrograms, instrumental errors, basic principles for identification of cometary emissions, wave length table for spectrum of head and tail of a comet, description of individual OH, NH, CN, CH, C_3, C_2, NH_2 and atomic band and lines of the head and of the tail of the comet. Also there is a comparison of the spectra of comets and of N-stars, auroras, twilight and night airglow and combustion phenomena. Further data on laboratory spectra of the above molecules are given in detail. (For more detailed information on various topics in the introductory text, see 12.1–131.) *Subject Headings:* **1. Comet spectra atlases 2. Spectra of comet molecules.**—*M.R.*

12.1–131 523.67:535.33

Swings, P. and Haser, L., **Notes on cometary spectra.** Liège. Université. Institut d'Astrophysique, Contract AF 61(514)-628-C, Technical Report, No. 2, [**1954?**]. 20 p. table, 13 eqs. Mimeo. "To provide additional or more detailed information on various topics briefly considered in the introductory text of their **Atlas of representative cometary spectra.**" (See 12.1–130.)—The notes give more detailed information on instrumental and observational factors, errors, influence of trailing on extension and intensity of cometary emission lines, and theoretical consideration on cometary models. Good spectra have been obtained from only 36 of the 300 comets observed in the past 50 years. *Subject Heading:* **1. Comet spectra.**—*M.R.*

12.1–132 523.67:535.33

Fehrenbach, Ch.; Haser, L.; Swings, P. and Woszczyk, Andrzej, **Observations spectroscopiques de la comète Arend-Roland (1956 h).** [Spectroscopic observations of the Arend-

Roland Comet (1956 h).] *Annales d'Astrophysique*, Paris, 20(4):145–154, July/Aug. **1957.** 2 figs., 4 tables, 9 refs. French and Russian summaries. **DWB, DLC**—At the heliocentric distances lower than 0.6 A.U., the emission spectrum of the 1956 h Comet shows a doublet D abnormally intense. The intensity of the continuum remains always high. A greater accuracy was obtained for the wave-lengths of the yellow-red emissions; these depend all on the transitions $(O, V_2', O) \rightarrow (O, O, O)$ of NH_2 for $5 \leq V_2' \leq 10$, the *Q*-branches being the most pronounced. *Subject Headings:* **1. Arend-Roland comet 2. Spectroscopic observations.**—*Transl. of authors' abstract.*

12.1–133 523.663:551.521.67

Biermann, Ludwig F. and Lüst, Rhea, **The tails of comets.** *Scientific American*, N. Y., 199(4):44–50, Oct. **1958.** fig., 7 photos. **DLC**—The knowledge of comets was summed up by F. L. WHIPPLE in 1951 and even today not too much is known of these solar satellites whose single circuit takes millions of years. Comets form a cloud-system at a distance of 50,000 to 100,000 astronomical units from the sun. Formation of tails may originate from vaporizing gases when and if a comet comes close enough to the sun, but formation of the tail may also depend on the chemical composition of the comet and on variation in solar activity. Three types of tails are illustrated and discussed. The straight tail may be controlled by the sun's corpuscular radiation as a function of friction whereas the curved shorter ones may well be due to light pressure. *Subject Headings:* **1. Comet tails 2. Corpuscular radiation effects on comets.**—*W.N.*

C8. RADIO ASTRONOMY

12.1–134 523.164.82

Somayajulu, Y. V. and Narayana Rao, N. (*both, Madras Inst. of Technology, Chromepet, Madras*), **Observations on galactic radiation at 30 Mc/s.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 17(12), Special Supplement, Dec. **1958.** p. 54–56. 2 figs., 8 refs. **DWB, DLC**—A Philips BX 925 A receiver, bandwidth 2.6 kc/s was used in the observations outside Madras since Oct. 1957, discussed briefly accompanied by plot of diurnal variation of the cosmic noise intensity, which rapidly increases after sunset, decreased after sunrise. *Subject Heading:* **1. Galactic radio noise.**—*W.N.*

12.1–135 621.396.633:522.2 523.164.32

Christiansen, W. N. and Mathewson, D. S. (*both, Radiophysics Lab., CSIRO, Sydney, Australia*), **Scanning the sun with a highly directional array.** *Institute of Radio Engineers, N. Y. Proceedings*, 46(1):127–131, Jan. **1958.** 6 figs., 12 refs. **DLC**—A survey is given of the very highly directive equipment and methods which have been devised to obtain details of the distribution of radio emission over the solar disk. A new instrument is described; it operates on a wavelength of 21 cm and gives, for the first time, radio pictures of the sun. This radio heliograph combines principles of the multielement interferometer and the Mills Cross. It consists of 64 parabolic antennas, 19 ft in diameter, arranged along two lines, each 1240 ft in length, in form of a cross. Multiple pencil beams about 3′ arc wide are produced by the system; by means of these, the sun is scanned television-wise. The radio heliograph is being used to produce daily pictures of the sun. *Subject Headings:* **1. Radio telescopes 2. Heliographs 3. Solar radio emissions.**—*Authors' abstract.*

D. OUTER ATMOSPHERE

1. IONOSPHERE

See also: **Ionos. obs. during IGY** (Waldmeier), 12.1–107; **D layer height** (Friedman, Chubb), 12.1–116; **Solar-ionos. relationships** (Malurkar), 12.1–117; **Outer atmos. research** (Dryden), 12.1–150.

12.1–136 537.56:538.69:551.510.535

Jancel, R. and Kahan, T., **Mécanique statistique des plasmas électroniques lorentziens et ses applications à l'ionosphere.** [Statistical mechanics of Lorentzian electronic plasmas and its applications to the ionosphere.] (In: Physical Society of London, **Physics of the**

ionosphere. London, 1955. p. 365–373. 11 refs., 35 eqs.) **DWB**—The distribution function of electronic velocities in an anisotropic plasma (constant magnetic field) for non-Maxwellian states (very strong electric fields) is calculated from the Boltzmann transfer equations. Explicit expressions are obtained for the magnetoionic conductivity, dielectric tensor, Hall effect coefficient, deviation of an electron beam and a generalization of the mobility equation of Langevin. The results are applied to the propagation of plane e.m. waves in an ionized gas, and using the authors' general theory all classical results for refractive index, phase and group velocity, attenuation, polarization, etc. are found. *Subject Headings:* **1. Magnetic field effects on ionosphere 2. Ionization of gases 3. Lorentzian electronic plasmas.**—*Physics Abstract*, 8102, 1955.

12.1–137 551.**510.535**:538.24:621.396.8

Mitra, S. N., **Self-gyrointeraction.** (In: Physical Society of London, **Physics of the ionosphere.** London, 1955. p. 71–73.) fig., table, 3 refs. **DWB** (M10.535 C748) -The phenomenon of self-gyrointeraction implies that when a sender is working near gyrofrequency, the received percentage modulation at a distant point on this transmission is markedly less than the percentage modulation impressed on the carrier at the sending end. Attempts have been made by workers in other countries to detect such lowering of percentage modulation on gyrofrequency emissions but, except in Italy, these experiments have met with little success. An experiment has been conducted in All India Radio in February 1954 utilizing its network of medium wave broadcast transmitters to find out the effect of self-gyrointeraction. 15 senders covering the frequency range of 590 to 1490 kc/s were made to radiate 1000 c/s tone, the percentage modulation being kept fixed at 80. The percentage modulation of the received signal of all the senders was measured at Delhi. The curve of received percentage modulation against wave frequency shows a significant dip at 1020 kc/s where the modulation was as low as 48%. The gyrofrequency at the E layer is, therefore, 1.02 Mc/s which yields the value of H at the E layer as 0.36 gauss, the value of the magnetic field at the ground level being 0.474 gauss. *Subject Headings:* **1. Ionospheric gyro-waves 2. Gyromagnetic effect.**—*Author's abstract.*

12.1–138 551.**510.535**:537.56:538.69

Kawabata, Kin-aki (*Tokyo Astronomical Obs.*), **The radiation emitted within ionized gas in the presence of a magnetic field.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 12(4):428–436, **1958.** 10 refs., 29 eqs. **DWB, DLC**—The intensity and the polarization of radio-frequency radiation emitted by an ionized gas in the presence of a magnetic field are investigated taking into account the simultaneous interaction of electrons with the surrounding ions. The calculation is made on the assumption that the refractive index of the surrounding medium is unity. It is shown that Stokes' parameters of the radiation emitted by an ionized gas can be obtained from the Fourier transformation of the correlation functions between the various components of the velocity of an electron separated by a time interval τ. These correlation functions are calculated using the Fokker-Planck equation and then Stokes' parameters of radiation are obtained. *Subject Headings:* **1. Magnetic field effects on ionization of gases 2. Ionization of gases.**—*Author's abstract.*

12.1–139 551.**510.535**:551.594.12

†Hok, Gunnar; Spencer, N. W.; Reifman, A. and Dow, W. G., **Dynamic probe measurements in the ionosphere.** Michigan. Univ. Engineering Research Institute, Contract AF 19(604)-1843, Scientific Report, FS-3, Nov. **1958.** 87 p. 37 figs., 21 refs., 76 eqs. "Reprint of previous report of same title, issued under Contract AF 19(122)-55 (and Contract W-33-038-ac-14050) Nov. 1951." (For abstract on original edition, *see* 5.2–95, Feb. 1954, *Met. Abstracts.*) Also reprinted and bound with this, their: **Supplementary Note** [to title as issued under earlier Contract AF 19(122)-55], Dec. **1952.** p. 90–91. **DWB** (M(051) M624sc). *Subject Headings:* **1. Ionization measurement techniques 2. E layer 3. Probe technique.**

12.1–140 551.**510.535**:06.045

Shapley, A. H., **Comité des Sondages Ionosphériques.** [Committee for Ionospheric Soundings.] *International Scientific Radio Union, Bulletin d'Information*, No. 112:14 15, Nov./Dec. **1958.** **DLC** Program of the future activities of the Committee for Ionospheric Soundings and projects for improvement of the organization. *Subject Headings:* **1. Ionospheric soundings 2. International Scientific Radio Union.**—*A.V.*

12.1–141 551.510.535:551.557.3:550.386.6

Price, R. E., **Travelling disturbances in the ionosphere.** (In: Physical Society of London, **Physics of the ionosphere.** London, **1955.** p. 181–190. 8 figs., 3 tables, 5 refs.) **DWB** (M10.535 C748)—The velocity and direction of travel of disturbances in the ionosphere have been measured at Perth, Western Australia, using a system of three spaced constant frequency pulsed transmitters. Results indicate a variation of the rate of travel of the disturbances from low values up to 20 km min^{-1}. The horizontal direction of travel is shown to vary between 90° and 210°E of N in the summer months and between 300° and 90°E of N in the winter months. Correlations were sought between the mean daily wind speed, the number of disturbances per day, and the mean daily size of disturbances with the auroral activity observed at MacQuarie Island (lat. 54°S, long. 159°E) and the K index of magnetic activity at Watheroo (lat. 30°S, long. 116°E) but were not observed. The measurements are shown to be in good agreement with similar observations made at Sydney, N.S.W., although the measured speeds suggest a time lag of only 7–13 hrs between disturbances in Perth and those observed in Sydney next day. Suggestions are put forward as to the nature of this effect. *Subject Headings:* **1. Ionospheric disturbances 2. Upper air wind variations.**—*Author's abstract.*

12.1–142 551.510.535 551.594.6 550.38:550.34

*Leipzig. Universität. Geophysikalisches Institut, **Geophysikalische Messreihen Geophysikalisches Observatorium Collm und Maritimes Observatorium Zingst** [Series of geophysical measurements of the Collm Geophysical Observatory and the Zingst Maritime Observatory], No. 1, Jan. **1958.** Latest issue seen, Nov. **1958.** continuously numbered. 301 p. Entirely tables. **DWB**—The mimeographed report consists mainly of tabulated data classified as follows: 1. Ionospheric measurements, 2. Observations of sferics, 3. Magnetic recordings and 4. Seismic recordings. Subdivisions are provided under each subject. *Subject Headings:* **1. Ionospheric measurements 2. Sferics observation 3. Magnetic observations 4. Seismic recordings.**—*W.N.*

12.1–143 551.510.535(914)

Hennessey, James J., **The Dellinger effect of February twenty-third, 1956.** *Philippine Studies*, Manila, 4(2):229–317, **1956.** 5 figs., 4 refs. **DLC**—A brief description of a sudden ionospheric disturbance, rare at this latitude, is given. The remainder of the article deals with the general background of this phenomena. *Subject Headings:* **1. Ionospheric disturbances 2. D layer 3. Baguio, Philippines.**—*A.A.*

12.1–144 621.396.9:551.557:551.510.535

Pütter, P. St., **Messung des Ionosphärenwindes aus der Wanderungsgeschwindigkeit eines Zustandes (z. B.: Echo-Feldstärke) längs der Erdoberfläche.** [Measurement of ionosphere winds by travel velocity of a condition (e.g. echo field strength) along the earth's surface.] (In: Physical Society of London, **Physics of the ionosphere.** London, **1955.** p. 191–201. fig. table, 3 refs. 23 eqs.) **DWB** (M10.535 C748)—The aim of the pulse-echo-method is to measure the speed of an amplitude pattern over the ground. For that purpose the fading records from at least three antennae are used and the speed of a portion of a line of maximum (or minimum) intensity is measured. It is, however, only the movement of such a line in a direction perpendicular to itself which can be detected; this may be called the speed of the line element. It is, then only possible to identify this speed with that of the whole amplitude-pattern if the pattern moves in a direction perpendicular to the line element. This is not usually the case, and a new method of analysis must be looked for. It is then found that the speed of the amplitude pattern cannot be deduced from one measurement of the speed of a line-element. The comparison of different possibilities shows that the 'method of time-vectors' is especially suitable. It is shown that the measured time differences may be regarded as the components of a vector which is called the 'time-vector.' If for a constant velocity of the amplitude-pattern all the measured time-vectors are drawn from one point, then their end points will be situated on a straight line. A simple calculation shows that the normal to this straight line gives the required speed of the amplitude-pattern. *Subject Heading:* **1. Ionospheric wind measurement techniques.**—*Author's abstract.*

D2. GEOMAGNETISM

See also: **Magnetic field effects on ionos.** (Jancel, Kahan), 12.1–136; **Gyromagnetic effects** (Mitra), 12.1–137; **Magnetic field effects on ionos.** (Kawabata), 12.1–138; **Magnetic obs.**, 12.1–142; **Magnetic field effects on convection** (Nakagawa), 12.1–361.

12.1–145 550.38:550.3:061.3

Kertz, W. (*Geophysikalisches Institut der Univ. Göttingen*), **Erdmagnetismus (Das Internationale Geophysikalische Jahr, 20).** [Terrestrial magnetism. (The International Geophysical Year, Pt. 20).] *Umschau*, Frankfurt a.M., 58(17):527–530, Sept. 1, **1958.** 6 figs. (incl. photos), port. **DLC**—In this nontechnical discussion of the IGY research on terrestrial magnetism the author discusses the instrumentation for measuring short period field variations such as pulsation, total intensity, etc. Terrestrial magnetic storms resulting from solar eruptions including their physical basis, frequency and the use of rockets in their investigation, numerical measures of terrestrial magnetic activity, magnetic pulsations and magnetic sounding of the earth. *Subject Headings:* **1. Terrestrial magnetism 2. Geomagnetic instruments 3. IGY geomagnetic program.**—*I.L.D.*

12.1–146 550.385.4:551.594.5(98/99)

Akasofu, Syun-ichi (*Geophys. Inst. Tohoku Univ.*), **On the electric field of the polar magnetic storm.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 12(3):268–272, Sept. **1958.** 9 refs., 6 eqs. **DWB**—It is the object of this paper to examine the origin of the electromotive force of the polar magnetic storms in relation to phenomena involving aurora and polar blackouts. It is suggested that the proton and electron streams rushing into the ionosphere have a common and powerful polarization electric field between them which might give rise to the currents of the polar magnetic storms between their narrow impact zones in the ionosphere. While the original purpose of this study was to find the electromotive force of the polar magnetic storm, it is found that this problem is closely related to whether the idealized current-systems, S_D (or D_S) and D_{St}, suffice to revive what is essential in the polar magnetic storms. *Subject Headings:* **1. Polar magnetic storms 2. Electric field theory of auroras.**—*Author's abstract.*

12.1–147 551.521.64:550.388.2

Simpson, J. A., **New experiments concerning the geomagnetic field extending into interplanetary space.** *American Geophysical Union, Geophysical Monographs*, No. 2:65–70, **1958.** 7 figs., 4 refs. **DLC**—Preliminary results of experiments on the nature of the earth's magnetic field beyond the surface of the earth are presented. A nucleonic component monitor composed of two separate neutron detectors and recording circuits was transported by aircraft at constant pressure altitude (18,000 ft alt) around the equator. The elapsed time for the 12 equatorial crossings was 43 days in 1956; during this time there were only small primary cosmic ray intensity variations. The curve of the longitude effect shows a remarkable symmetry. The maximum and minimum intensities of each latitude curve are nearly 180° apart and the areas under the two halves of the curve are approximately equal. "There are no large contributions from functions with a period greater than 2π." The peak amplitude is 25%. "This demonstrates that the equivalent magnetic center of the earth is eccentric with respect to the axis of rotation." The peaks of the curve are displaced approximately 40° west of the cosmic ray longitude curve predicted from the dipole terms of the spherical harmonical analysis, and in the direction of the maximum surface magnetic fields. The determination of the effective equator for cosmic rays is discussed and curves showing the longitude effect for the nucleonic component at the cosmic ray equator, the curve of the cosmic ray equator and curves giving a schematic explanation of the asymmetry of the cosmic ray equator, and a comparison of the cosmic ray dipole and dip equator, etc., are presented. *Subject Headings:* **1. Geomagnetic field 2. Cosmic ray variations 3. Geomagnetic effects on cosmic rays.**—*I.L.D.*

12.1–148 550.385

†Fanselau, G. and Lucke, O. (*both, Geomag. Observ. Potsdam-Niemegk, Kreis Belzig*), **Über die Veränderlichkeit des erdmagnetischen Hauptfeldes und seine Theorien.** [Variability of the main geomagnetic field and its theories, (Pt. 1).] *Zeitschrift für Geophysik*, Würzburg, 22(3/4):121–216, **1956.** 14 tables, 47 refs., 75 eqs. German and English summaries p. 121–122. **DLC** (QC801.Z4) –Pt. A –The variability of the geomagnetic field and its density of energy is described by means of its potential developments in a new manner. The two poles of the quadrupole still show besides a westward drift of 24°/100 years a movement northward resp. southward of the same strength. Pt. B—It is shown, how multipoles can be produced by simple zonal current systems. Their skin-effect is considered. Pt. C—The extended convection streams, which effect the secular variation of the length of the day are confined to planes perpendicular to the axis of rotation. They are not connected directly with the secular variability of the geomagnetic field, the origin of which must be confined on a boundary layer of the upper border of the core. It may be described by means of hydromagnetic theories. Pt. D—If one regards in agreement with H. Miki the matter of the outer core as highly ionized plasma, the geomagnetic field may be interpreted as an effect of boundary layer. Its westward drift now is the westward migration of long hydrodynamic waves. The migration of the poles of the quadrupole is influenced by the sign of its turning direction. *Subject Headings:* **1. Geomagnetic field variability 2. Geomagnetic theories 3. Geomagnetic poles.**—*Authors' abstract.*

12.1–149 550.385

Lucke, O. (*Geomag. Inst., Potsdam*), **Über die Verändelichkeit des erdmagnetischen Hauptfeldes und seine Theorien.** [Variability of the main geomagnetic field and its theories, (Pt. 2).] *Zeitschrift für Geophysik*, Würzburg, 23(4):197–224, **1957.** 10 figs., 6 tables, 31 refs., 11 eqs. German and English summaries p. 197–198. **DLC** (QC801.Z4)—Continuation of the paper by G. Fanselau and Lucke (*see* 12.1–148). It is shown: a) that the westward drift of the various multipoles, representing the geomagnetic main field, has various magnitudes. The strongest drift is shown by field of the quadupole, the next one being that of the octupole, etc. b) that in the core of the earth there must be olivine and metallic iron. W. H. Ramsey's hypothesis cannot be quite right. Using J. J. Gilvarry's theory of fusion a distribution of temperature within the earth is found. It is compared with results of other authors. In hydromagnetics of the smoothed velocity field the magnetic viscosity μ_m is to be replaced by an antimetric tensor, while in familiar hydrodynamics the viscosity $\nu^* = n/p$ must be replaced by symmetric tensor. It does not seem possible to build up on this result a theory of the geomagnetic main field. A dynamo-theory of the field seems only to be allowable in E. N. Parker's manner. c) that a theory of the geomagnetic main field can build on the Tolman-effect provided that there is at the equator of the earth's core a circulation, eastward drifting with velocities greater than those that are found by the westward drift of the geomagnetic main field and the variation of the earth's rotation. *Subject Headings:* **1. Geomagnetic drift 2. Geomagnetic poles 3. Geomagnetic theories.**—*Author's abstract.*

D3. ASTRONAUTICS—SATELLITES

See also: **Functions of animals during space flight** (Denton), 12.1–75; **Space medicine** (Strughold), 12.1–76.

12.1–150 551.510.536:629.19:613.693

Dryden, Hugh L. (*Natl. Advisory Comm. for Aeronautics*), **Space technology and the NACA.** *Aeronautical Engineering Review*, N. Y., 17(3):32–34, 44, March **1958.** 2 photos. **DLC**—The author delivered a policy speech on Jan. 27, 1958 at the 26th Annual Meeting of the National Advisory Committee for Aeronautics. He outlined the program that should be adopted by the government in space research in order to achieve the goal of a manned or unmanned spacecraft arriving on the moon and its successful return to the earth. Emphasis is placed on space technology or intensive scientific studies of the universe in all its astronomical, geophysical and meteorological aspects as well as the necessary researches on the phenomena of the high upper atmosphere and nearby space, such as the character and distribution of matter, cosmic rays, solar radiation, electric, magnetic and gravitational fields. *Subject Headings:* **1. Interplanetary flights 2. Space technology 3. Outer atmosphere research.** —*N.N.*

12.1–151 551.510.536:613.693:629.19

Haber, Heinz (*Dept. of Space Medicine*), **Flight at the borders of space.** *Scientific American*, N. Y., 185:20–23, Feb. **1952.** photos. **DLC** (Reprinted in: U. S. School of Aviation Medicine, **Epitome of space medicine (Reprints 1950–1957)**, Article No. 16.)—Various problems of high-altitude flights are discussed and illustrated to show that the borders of space depend on the specific problem in question rather than on a certain definite altitude. The difference between flights and travelling in space is a matter of time encountered by man in space from 10 mi and upwards. It is commonly considered that the atmosphere ends and the space begins at about 600 mi altitude where aurora borealis ceases to appear due to rarefaction of the air molecules which already at 250 mi are rarer than in the best man-made vacuum. *Subject Headings:* **1. Interplanetary flights 2. Space medicine 3. Outer atmosphere research.** —*W.N.*

12.1–152 551.507.362.1:551.521.1

Mercure, R.; Miller, S. C., Jr.; Rense, W. A. and Stuart, F. (*all, Univ. of Colorado, Boulder*), **The sun's disk in Lyman-alpha radiation.** *Journal of Geophysical Research*, Wash., D. C., 61(3):571–573, Sept. **1956.** fig. (photos), foot-ref. **DLC**—Four photographs of the sun in Lyman-alpha radiation were obtained at a height of 145 km with a camera in an intermediate Aerobee rocket. Comparison is made with photographs from the ground in calcium II light and in hydrogen H-alpha light. There is a strong correlation between the positions of enhanced Lyman-alpha intensity and those of the active sunspot and plage areas. A variation of Lyman-alpha intensity during the solar cycles and in individual solar disturbances is to be expected. *Subject Headings:* **1. Solar Lyman alpha radiation 2. Rocket observations of sun 3. Photographs of sun.**—*S. Fritz.*

12.1–153 551.501.81:551.507.362.2

Wolfe, J. L. (*Natl. Res. Council, Canada*), **Satellite tracking by H. F. direction finder.** *Journal of Atmospheric and Terrestrial Physics*, London, 13(1/2):155–164, Dec. **1958.** 12 figs., 6 refs. **DLC**—A method of satellite tracking using an H. F. direction finder is outlined and commented on. The results of tracking Sputniks I and II are given, along with an approximation of the size of error to be expected. *Subject Headings:* **1. Satellite tracking 2. High frequency direction finder.**—*Author's abstract.*

12.1–154 551.507.362.2:551.591.3

Tsesevich, V. P., **Ob izmenenii bleska vtorogo iskusstvennogo sputnika Zemli.** [Variation of the brightness of the second artificial earth satellite.] *Priroda*, Moscow, 47(4):78–79, April **1958.** fig. **DLC**—The brightness of the second artificial earth satellite exceeded the brightness of Vega in some passages and in others it was of the order of magnitude of the Polar star. This variation in brightness indicates that the satellite rotates around an axis which does not coincide with the longitudinal geometrical axis of the rocket carrier, since this rotation can be compared with tumbling. When the satellite with its carrier presents the smallest area to the observer its brightness is a minimum; when the area observed is the maximum, the brightness is a maximum. The brightness may be influenced by its orientation to the sun's rays. The period of variation of brightness is equal to half the period of rotation of the satellite about its axis. The conduct of observations on artificial satellites at the Odessa Astronomical Observatory is described. A graph showing the variation of the brightness of the second earth satellite is presented. *Subject Heading:* **1. Satellite brightness variations.**—*I.L.D.*

12.1–155 551.507.362:531.55/6

Miele, Angelo (*Douglas Aircraft Co., Inc., Santa Monica, Calif.*), **Optimum burning program as related to aerodynamic heating for a missile traversing the earth's atmosphere.** *International Astronautical Congress, Proceedings of the 8th Congress, Barcelona, 1957*, issued

Vienna, **1958.** p. 257–277. 13 figs., 9 refs., 82 eqs. English, German and French summaries p. 257. **DLC** (TL787.I44)—The burning program for a rocket-powered missile moving along a rectilinear path is investigated in the light of the thermal effects induced by such a program on the missile skin. Pt. I considers the problem of determining the thrust-time relationship which minimizes the difference ΔG between the final and initial values of an arbitrarily specified function $G(t, m, h, V, T)$ of time, mass, altitude, velocity and skin temperature, for the case where the so-called induced drag is negligible with respect to the zero-lift drag. It is shown that the totality of extremal arcs is composed of zero-thrust sub-arcs. For problems not involving time, an explicit solution is obtained for the optimizing mass flow as a function of the local coordinates of the missile. In Pt. II closed form solutions are derived under the assumptions of isothermal atmosphere, negligible drag, negligible irradiation and constant Stanton number. Particular problems such as the one of minimum increase in skin temperature are treated within the general frame of the present theory. The boundary value problem is investigated and useful criteria are supplied for constructing extremal paths under various types of boundary conditions. Several numerical examples are included, illustrating the effect of important design parameters on the physical nature of the optimum burning program. *Subject Heading:* **1. Rocket propulsion.**—*Author's abstract.*

12.1–156 **551.507.362**:629.19

Haley, Andrew G. (*Pres. Int. Astronautical Federation*), **Out of the space age: jobs and profits.** (2) p. reprint from *Changing Times*, Wash., D. C., June **1958.** **DLC** —The author, who is president of the International Astronautical Federation, outlines some aspects of economics as related directly to the vehicular conquest of space and gravity. The U. S. aviation industry has $\frac{1}{3}$ of its man power (i.e. 300,000 men) in the missile industry today, will use more than $\frac{1}{2}$ of its man power in the next two years and will employ more men than any other single U. S. business within 10 yrs. Opportunities for scientists, engineers, technologists and for the capital investors are very promising. A cross section list of 21 U. S. companies already heavily engaged in the booming missile business is provided for reference. *Subject Heading:* **1. Careers in astronautics.**—*W.N.*

12.1–157 551.**507.362.2**:521.312

Petersen, Norman V., **Summary of proposed methods for determining satellite lifetimes.** *International Astronautical Congress, Proceedings of the 7th Congress, Rome, 1956*, issued Rome, **1956.** p. 789–810. 10 figs., table, 16 refs., 20 eqs. **DLC** (TL787.I44)—Recent literature has illustrated the points-of-view of several authors on procedures for using orbit tracking information from the Project Vanguard satellite to calculate the atmospheric density variation with altitude or conversely, to determine the orbit lifetime based on an accepted density variation. The task of determining this density variation with altitude, $\rho = f(h)$, is an extremely complicated problem, both from the standpoint of measurement and correlation of orbit coordinate data and the mathematics involved. On one hand, the actual orbit coordinate data obtainable from optical and radio observations may well be relatively sparse. The very limited number of ground observation stations, coupled with the many attenuating aspects such as cloud cover, electronic failure and others, may provide at best only a small number of positional fixes of the orbit. It is quite probable that continuous orbit tracking with several fixes per revolution, will be the exception to the rule. On the other hand, only machine computational techniques will permit the solution of the equations of motion from the available data points. The mathematical problem is complicated by the fact that not only several dissipative forces exist, but that other perturbing forces may make it difficult to discriminate drag effects from the resultant perturbations. The purpose of this paper is to briefly review the several methods proposed to determine the orbit lifetimes and the density-altitude relationship by considering satellite orbit displacements. *Subject Headings:* **1. Satellite orbits 2. Ionospheric density variations.**—*Author's abstract.*

D4. AURORAS

See: **Elec. field theory of auroras** (Akasofu), **12.1–146.**

E. SOLID EARTH GEOPHYSICS

1. VOLCANOLOGY

12.1–158 551.234

*Conrad, V., **On thermal springs: a contribution to knowledge of their nature.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(3):371–405, **1956.** 5 figs., 23 tables, 12 refs. English, German and French summaries p. 371–374. **DWB**—Daily or weekly observations of temperature and discharge of 14 thermal springs at Badgastein (Austrian Alps) are tabulated and graphed. A simultaneous sudden increase of temperature by 1°C on May 11–12, 1931, and decrease of May 23 show that all originate from the same underground source. Causes of variations are discussed and it is concluded that the penetration of rainwater into this source is small and doubtful. Only 4 springs of medium temperature show a real annual variation of temperature and discharge. *Subject Heading:* **1. Thermal springs.**—*C.E.P.B.*

12.1–159 551.21:525.6

*Ewing, Maurice and Press, Frank, **Tide gauge disturbances from the great eruption of Krakatoa.** Columbia Univ. Lamont Geological Observatory, Contract AF 19(122)-441, Technical Report, No. 27; Technical Report on Seismology, No. 27, April **1953.** 10 p. 4 figs., table, 8 refs. **DWB**—A study of the arrival times of barometric and tidal waves initiated by the Krakatoa (1883) explosion, at tide gage stations in several remote portions of the earth, revealed a coupling between atmospheric and ocean (tidal) waves that is thought to be a result of transference of energy from the barometric disturbance to the sea. This coupling tends to prolong the propagation of the long period waves in both media. Data are presented in tabular form. *Subject Headings:* **1. Air-coupled tidal waves 2. Krakatoa eruption (1883).** —*M.R.*

12.1–160 551.21

Barlow, E. W., **Krakatau, 1883.** *Marine Observer*, 25(170):221–227, Oct. **1955.** fig. **DWB**—Description of eruptions of Aug. 1883, the air and sea waves and the audibility of the explosion. The resulting changes of geography are shown. Observations on ships are summarized; the report of the S.S. "Gouverneur-Generaal Loudon" (Aug. 26–29) is quoted in full. The optical phenomena are described. *Subject Headings:* **1. Krakatoa eruption (1883) 2. Volcanic eruptions.**—*C.E.P.B.*

E2. SEISMOLOGY

See also: **Seismic recordings, 12.1–142.**

12.1–161 550.34:534.64

Chauveau, Jean; Grau, Gérard and Lavergne, Michel, **Réalisation de sismogrammes synthétiques comprenant toutes les réflexions multiples au moyen d'un système analogique électro-acoustique.** [Achievement of synthetic seismograms including all the multiple reflections by means of an electro-acoustic analogy system.] *Académie des Sciences, Paris, Comptes Rendus*, 250(5):887–889, Feb. 1, **1960.** 3 refs. **DWB, DLC**—The problem of synthetic seismograms with multiple reflections consists in searching the solution $U(o,t)$ of the equation

$$\frac{\partial}{\partial z}\left(\rho V^2 \frac{\partial U}{\partial Z}\right) = \rho \frac{\partial^2 U}{\partial t^2} \tag{1}$$

representing the propagation following OZ of plane waves in an isotropic and continuously variable medium; $U(Z,t)$ is the displacement of material particles at the depth Z and time t, $V(Z)$ is the propagation of energy at the depth Z and $\rho(Z)$ is the density of the medium at the depth Z. The variable medium is represented by a superposition of thin layers with plane and parallel faces, in each of which one supposes that the speed and the density are constant. Resulting from this one can replace the equation (1) by a system of differential equations with coefficients. This resolution has been made practical by means of an analogic system making use of the properties of the propagation of elastic impulses by plane waves in a metallic rod, the section of which varies as the acoustic impedance at the subterranean level, the diameter remaining weak as compared with the average wave length of the impulse which propagates therein. *Subject Headings:* **1. Synthetic seismograms 2. Acoustical propagation below the surface 3. Acoustical impedance.**—*A.V.*

12.1–162 550.341.7

Jobert, Nelly, **Calcul de la dispersion des ondes de Love de grande période à la surface de la Terre.** [Calculation of the dispersion of long period Love waves at the earth's surface.] *Académie des Sciences, Paris, Comptes Rendus*, 250(5):890–892, Feb. 1, **1960.** fig., table, 6 refs. **DWB, DLC**—By numerical integration of the differential equation of the movement, one obtains the phase speed of the Love waves for B. GUTENBERG's model with a continental crust. In this model, the continental crust has been represented by a homogeneous superficial layer with a thickness $H = 35$ km and in which the speed of the S waves is $W = 3.6$ km/s. For the fundamental mode, the curve representing the variation of the phase speed is regular; the presence at 150 km depth of a layer with minimum speed does not give anomalies. For the first harmonic, the curve of phase speed presents an abnormal variation for the wave lengths smaller than 400 km. From this results a minimum of the group speed for wave lengths in the range of 260 kms and a maximum for shorter wave lengths. This anomaly is due to the successive increases of speed of the S waves from the surface, owing to the existence of the intermediate region (B) under the crust. There appears a secondary maximum of group speed fairly equal to the speed in the intermediate layer for a wave length in the range of 70 km, and a secondary minimum for a wave length ranging about 300 km. This phenomenon can be attributed to the thinness of the superficial layer with regard to the intermediate layer (region B). *Subject Heading:* **1. Love waves.**—*A.V.*

12.1–163 550.340.1

†Heinitz, Karlheinz, **Das Problem der Bündelung von Geophonen.** [The problem of multiple geophones.] *Freiberger Forschungshefte, Ser. C Geophysik*, Berlin, No. 66, **1959.** 49 p. 35 figs., 23 refs., eqs. **DLC**—An investigation of the causes of the disturbances after research made by Russian, English and American scientists; classifications of regular and irregular disturbance are proposed. The article gives an insight into the methods of suppression of disturbance waves by multiple geophones. The author develops two theories for the calculation of the geophone groups and the determination of number of geophones necessary in each group. Application of both theories is dependent on the disturbance recorded on the seismograph. A section also gives some examples of ameliorated seismograms by multiple geophones. *Subject Headings:* **1. Seismology 2. Seismographs 3. Multiple geophones.** —*A.V.*

12.1–164 550.341

†Schaffner, Hans-Joachim, **Die Grundlagen und Auswerteverfahren zur seismischen Bestimmung von Erdbebenmechanism.** [Basis and exploitation of methods in seismic determination of earthquake mechanism.] *Freiberger Forschungshefte, Ser. C Geophysik*, Berlin, No. 63, **1959.** 183 p. 98 figs., tables, bibliog. pp. 134–139. **DLC**—The theoretical part of the article gives the mathematical basis. The author considers: mathematical models of earthquake mechanism; geometrical problems; methods for interpretation of longitudinal and transverse waves and all other possibilities in interpretation. A chapter considers: the means and methods in regional work; dislocation-tectonic relationships; the geotectonical hypothesis of earthquake mechanism. *Subject Headings:* **1. Seismology 2. Earthquake mechanism.**—*A.V.*

12.1–165 550.34

Rosemann, Heinz, **Der Einflusz der Ankopplung des Seismometers an den Untergrund auf die Energieübertragung.** [Influence of the coupling of the seismometer to the subsoil on energy transport.] *Freiberger Forschungshefte, Ser. C Geophysik*, Berlin, No. 64, **1959.** 63 p. 34 figs., 9 tables, 28 refs. **DLC**—Theory and experiments have shown that a geophone at the earth's surface constitutes a vibration system because of the elastic contact with the subsoil. Dependence of resonance properties of geophone and earth-constants are discussed.

Because of the resonance, the vibration system geophone-ground, can be the origin of rather persistent vibrations produced under the influence of waves arriving at the geophone; accordingly, the resonance appearance has to be diminished. The article gives a good insight into the basic theories; the experimental research in laboratory and in practice, and the comparison between experimental and theoretical results. Experimental research method on resonance of vibration system geophone-earth and also the apparatus for measurement are described. Different methods for measurement and the influence of geophone-radius and geophone-volume are discussed. *Subject Heading:* **1. Seismology.**—*A.V.*

12.1–166 550.342

De Panfilis, M., **Note sopra un breve periodo sismico svoltosi nel territorio di Montespertoli durante il mese di giugno 1958.** [Note on a short seismic period near Montespertoli in June 1958.] *Annali di Geofisica*, Rome, 11(3/4):237–240, July/Oct., **1958.** fig., ref., eq. Italian and English summaries p. 240. **DWB, DLC**—A report on a seismic period which took place in June 1958 in the area of the Commune of Montespertoli, southwest of Florence. It covers the study of the macroseismic propagation of the principal shock which took place at about 18 hrs 55 min. (E.C.m.t.) on June 7 and allots the epicentral coordinates. A reference is made to seismic activity recorded in the Montespertoli area in the past. *Subject Headings:* **1. Microseism periods 2. Montespertoli, Italy.**—*Author's abstract.*

12.1–167 550.341

Droste, Zofia and Teisseyre, Roman (*both, Warsaw*), **Mechanizm trazesienia Ziemi w ujeciu teorii dyslokacji.** [The mechanism of earthquakes in terms of the dislocation theory.] *Przegląd Geofizyczny*, Warsaw, 4(1):3–18, **1959.** 6 figs., table, 18 refs., 17 eqs. English summary p. 18. **DWB, DLC**—A new mechanism of earthquakes is evolved in the light of the physical dislocation theory. The basic assumptions are the existence of a nonhydrostatic part of stresses in the medium P_{23} and a supposed distribution of inhomogeneities. This distribution determines a given plane and its neighbourhood, as the plane of active dislocation processes (slip plane, $x_2=0$). It is shown that the inhomogeneities could be represented by the loop dislocations in the presence of the field P_{23}. The loop dislocations may increase under the influence of the field P_{23} and under the interaction between themselves (synthesis of loops). As the result, there arise pairs of the screw as well as edge dislocations. Then the dislocations from the same pair are constrained by the strong field P_{23} to part asunder. In such manner the slip area increases. The junction of the two dislocations from the neighbouring pairs gives their annihilation and release of their energy, this is accompanied by further increase in the homogeneous slip area. Similarly, when the dislocation reaches the Earth's surface its energy will be released (in comparison with the preceding case a factor of $\frac{1}{2}$ must be introduced in the formula). The comparison of the discharge energy is in good agreement with the observation data. *Subject Headings:* **1. Earthquakes 2. Dislocation theory of earthquakes.**—*Authors' abstract.*

12.1–168 550.34:532.59:662.2:539.1

Rocard, Y., **Sur les signaux séismiques de longue période obtenus lors du test nucléaire de Reggane, le 13 février 1960.** [The long period seismic records obtained from the nuclear test at Reggane on Feb. 13, 1960.] *Académie des Sciences, Paris, Comptes Rendus*, 250(12):2244–2246, March 21, **1960.** fig., 2 refs. **DWB, DLC**—The nuclear test near Reggane on Feb. 13, 1960, provoked a Rayleigh type surface seismic wave at El Goléa in close conformity with the theoretical forecasts for an excitation by impulse. At Tamanrasset, 686 km away, on a granitic soil, only a vertical component was observed. These facts support the idea that the detection by long waves is important for controling nuclear explosions. *Subject Headings:* **1. Seismic waves 2. H-bomb tests 3. Reggane, Algeria.**—*A.V.*

12.1–169 551.462:550.34:532.59

Grinda, L., **Nouveaux aspects des ondes T.** [New aspects of the T waves.] *Académie des Sciences, Paris, Comptes Rendus*, 250(12):2241–2243, March 21, **1960.** fig., ref. **DWB, DLC**—This article constitutes a complement to the theory of Ewing, Worzel, Press and Tolstoy on T waves. The study is based on numerous observations of T waves made at

Monaco following seisms in North Africa. It is principally devoted to the problem of the passage of soil vibratory energy at the sub-marine sound channel. The author produces evidence of the fundamental part played by the shape and orientation of the sub-marine relief in the amplitude variations of T waves. He shows, moreover, that when the surface of the sea is rough a loss of energy takes place in every cycle of reflection, the amplitude of the T waves being reduced accordingly. If the bottom of the sea has no slope the rays sent back to the bottom by the surface are at least partially refracted in the soil, while losing energy so that after some cycles the residual energy is quasi zero. The T waves can thus only propagate when the vibratory energy passes from soil to water through a slope having a sensible declivity. *Subject Headings:* **1. Seismology 2. Sub-marine relief influence on T wave refraction.**—*A.V.*

12.1–170 550.34:631.42:523.59

†Bornmann, Günther, **Grundlagen und Auswerteverfahren der dynamischen Baugrundseismik.** [Bases and methods of dynamic soil examination.] *Freiberger Forschungshefte, Ser. C. Geophysik,* Berlin, No. 65, **1959.** 99 p. 58 figs., 63 refs., eqs. **DLC**—The article discusses dynamic soil analysis using stationary waves and forced vibrations in order to determine the value of soil for construction. The properties of development and the nature of elastic waves are not completely established, just as the theory of forced vibrations has not been experimentally verified. In 1954, FORTSCH gave a method for soil examination by seismic surface waves. The author mentions the research work of MILITZER in this field. Chapters discuss the analysis of soil by stationary seismic waves; theory of wave development; value of amplitude measurements and soil analysis by forced vibrations. *Subject Headings:* **1. Seismology 2. Seismic surface waves 3. Dynamic soil analysis.**—*A.V.*

E3. TECTONICS

12.1–171 550.311:523.12

Egyed, L. (*Estvös Univ., Budapest*), **The expansion of the earth in connection with its origin and evolution.** *Geophysica,* Helsinki, 7(1):13–22, **1959.** fig., 11 refs., 11 eqs. **DWB, DLC**—The author, summarizing the physical background of the Earth's expansion, gives a new explanation for the origin of the solar system. The explanation seems to be in good agreement with all observational facts. Moreover, starting from this conception, one can explain the existence of the Gutenberg low-velocity channel by material differences instead of thermal effects. But taking into account the expansion, the consequence of this result is the variation of the depth of channel in different areas. The seismological observations are in good agreement with this consequence. *Subject Headings:* **1. Cosmogony 2. Origin of earth.** —*Author's abstract.*

12.1–172 551.41:551.241

Nanda, J. N. (*Naval Headquarters, New Delhi*), **Fragmentation and continents.** *Journal of Meteorology and Geophysics,* Delhi, 7(1):92, Jan. **1956.** fig., eqs. **DWB, DLC**—A simple theory of fragmentation cannot explain the number and size of continents and large isolated land masses on the earth. If only the continents are considered the agreement with theory becomes worse. So other factors such as effect of rotation of earth acting on viscous materials must be considered. *Subject Headings:* **1. Continental formation 2. Earth's crust.**—*M.R.*

12.1–173 551.311

Stoneley, Robert (*Dept. of Geodesy and Geophysics, Cambridge*), **The thickness of the continents.** (In: Beer, Arthur (*ed.*), **Vistas in astronomy.** pub. London, **1955–1956.** Vol. 2:842–849. 15 refs.) **DLC, DWB** (520.82 B415v)—The continents are distinguished from the oceanic basins not only by a difference of elevation, but by a difference of composition and structure. The evidence is partly from seismology, partly from observations of gravity, and partly from measurements of thermal gradients at the surface. This paper reviews the information about the Eurasian continent which is at present more closely coordinated than for the rest of the world. *Subject Headings:* **1. Geodynamics 2. Continents.**—*From author's abstract.*

12.1–174 551.242:551.461.2

Bergsten, Folke, **Land uplift in Sweden from the evidence of the old water marks.** *Geografiska Annaler*, 36(1/2):81–111, **1954.** 19 figs., 2 tables, 7 refs., eqs. **DWB.** Reprinted as *Sweden. Meteorologiska och Hydrologiska Institut, Meddelanden, Ser. D*, No. 7, **1954.** – A map of land uplift is compiled from mareograph records and old water marks. Back in 1740 this phenomenon was explained by evaporation of water (CELSIUS and LINNE). *Subject Headings:* **1. Land uplift 2. Sea level changes 3. Sweden.**—*A.A.*

F. OCEANOGRAPHY, GLACIOLOGY AND HYDROLOGY

1. OCEANOGRAPHY

See also: **Carbon dioxide in oceans** (Bolin, Eriksson), 12.1–272; **Barbados storm swell** (Donn, McGuinness), 12.1–351; **Coastal wind currents** (Fedorov), 12.1–352; **Ocean-atmos. interaction** (Hanzawa), 12.1–353; **Warming of N. Atlantic** (Bjerknes), 12.1–403.

12.1–175 551.513.1:551.526.6(265/266)

Hanzawa, Masao (*Japan Met. Agency*), **Studies on the inter-relationship between the sea and the atmosphere, Pt. 3.** *Oceanographical Magazine*, Tokyo, 10(1):91–96, June **1958.** 4 figs., 12 refs. **DLC** Anomalies of sea surface temperature at coastal stations along the Pacific coast of Japan and of North and South America are compared in connection with simultaneous atmospheric circulation over the North Pacific. When a single negative pressure anomaly pattern over the North Pacific is a dominant feature, the intensity of the Aleutian Low is believed to be above normal and that of the Pacific High is believed to be below normal. In such a case, water temperature anomalies on the American side show large positive values and those on the Japanese side show large negative values. The opposite situation occurs when a single positive pressure anomaly prevails over the Pacific. The circulation and temperature anomalies of 1926 are analyzed as a good example of the former case while those of 1955 are analyzed as an example of the latter. *Subject Headings:* **1. Ocean-atmosphere interaction 2. Sea surface temperature 3. Pacific Ocean.**—*Author's abstract.*

12.1–176 551.556.8:551.461.2:532.593

Banal, M., **Présentation de quelques aspects de recherches récentes sur l'agitation de la mer.** [Some aspects of recent research on sea waves.] *La Houille Blanche*, Grenoble, 15(2): 103–112, March/April **1960.** fig. French and English summaries. **DLC**—The analysis of wave disturbance generated on the surface of the sea by wind is too complicated to be studied in a general fashion. Recent theoretical studies have taken different and often contradictory lines. The author has tried to list these studies according to the complete and exact laws governing the phenomenon. The following categories are considered: Studies concerning the generation of waves by the wind and leading to wave forecasting methods; studies which take viscosity effects into account and deal with the effect of waves on the sea bed and on obstacles; the finding of periodic solutions to linearized hydrodynamics. *Subject Headings:* **1. Wind effects on sea level 2. Wave motion 3. Wave formation 4. Wave forecasting.**—*Author's abstract.*

12.1–177 551.556.8:532.593:551.461.2

Brovikov, I. S., **O raschete elementov vetrovykh voln pri peremennom vetre.** [Calculation of wind wave elements in the case of variable winds.] *Moscow. Gosudarstvennyĭ Okeanograficheskiĭ Institut, Trudy*, No. 38:3–10, **1957.** 5 refs., 23 eqs. **DWB, DLC**—In computing the elements of wind waves for variable winds it is assumed that the wind energy transmitted to a wave surface on a sea is proportional to the square of the wind velocity, i.e. kv^2. A part of the energy maintains wind waves or their development, another part is dissipated because of viscosity and turbulent movement. The computation of energy dispersion is determined by means of the semi-empirical theory of the turbulence formula

$$F=\rho\int_v\int\int l^2\,\overline{\left[\frac{\partial u}{\partial y}\right]\left(\frac{\partial u}{\partial y}\right)^2}\,dv$$

where ρ=density of water, $u=a\omega e^{-ky}\cos(kx-\omega t)$=horizontal components of velocity of particles during wave movement; v=volume of fluid where the dissipation of energy takes place; a=amplitude of waves; $k=2\pi/\lambda$; λ=length of a wave; l=length of path of displacement. By a series of integrations it is shown that $F=\alpha_1\rho h^3\omega^3$ where α_1=numerical coefficient and F refers to unit area. From the intensity of dispersed energy and the expression of wind energy transmitted to the wave surface the equation of energy balance is formulated. The equation $h(dh/dt)=k_1v^2-k_2h\sqrt{v}$ where $h=2a$=height of wave, and k_1 and k_2 numerical constants. The solution of this equation is presented. *Subject Heading:* **1. Wind wave theories.**—*I.L.D.*

12.1–178 551.461.2:532.593

Jolas, P., **Passage de la houle sur un seuil.** [The passage of waves over a bar.] *La Houille Blanche*, Grenoble, 15(2):148–152, March/April **1960.** 6 refs. French and English summaries. **DLC**—During the course of research on waves carried out at the University of Grenoble Mechanics of Fluids Laboratory, the author became interested in the effect of a submerged bar on wave propagation. A linear treatment appears to be adequate for interpreting observations involving a low rectangular bar. When the depth above the bar is relatively smaller, very short transmitted waves are observed and an attempt is made to interpret them by a nonlinear treatment. *Subject Headings:* **1. Sea currents 2. Swell 3. Wave motion.**—*Author's abstract.*

12.1–179 551.556.8:551.515:551.461.2

*Krylov, Iu. M., **Metody rascheta elementov vetrovykh voln, ikh proverka i primenenie k vychisleniiu maksimal'nykh razmerov shtormovykh voln Apsheronskogo morskogo raĭona.** [Methods of computing wind wave parameters, their verification and application to calculating maximum storm surge for the sea near Apsheron.] *Moscow. Gosudarstvennyĭ Okeanograficheskiĭ Institut, Trudy*, No. 36:63–86, **1957.** 6 figs., 13 tables, 9 refs., 20 eqs. **DWB**—The methods of Brovikov, Titov and of the author for computing the maximum heights of waves during a storm are evaluated for their accuracy by comparing the mean heights and mean periods of waves calculated by means of them. The data used for verification were the instrumental observations of 5 storms recorded at the wave recording station Neftianye Kamni during 1954–1955 (Vilenskiĭ, Ia. G. and Glukhovskiĭ, B. Kh., **1957.** *See* 10.9–233, Sept. 1959, *Met. Abstracts*). The method of verification of the computation of wave elements during their development was based upon either maps of wind fields or wind data at the point of observation. The results of computation of mean maximum wave heights by the various methods, and observed mean maximum wave heights of mean wave heights computed with observed values during the stage of growth of waves, and of mean periods computed by means of observed periods during stage of growth of the waves, are presented in tables; they show that the method of Krylov provides the most exact results. The proposed method which enables the calculation of mean wave heights at a point, the mean heights of three-dimensional waves, the mean lengths of periods and other wave elements for any storm is based upon a statistical theory of wind waves according to which wind waves represent a process of turbulent pulsational movements of the sea surface produced by the action of wind flow. The theoretical foundations of the method developed by the author, nomograms for computing mean periods of wind waves as a function of wind velocity and duration, and as a function of wind velocity and length of wave fetch, and for computing mean wave heights at a point according to known values of mean wave period and wind velocity, are presented. The practical application of the proposed method of computation is outlined and the results of computation of the maximum possible heights of wind waves and ridges for the Apsheron marine district, and the computation of the frequency of storm waves of different dimensions in this district, on the basis of long period observations, are presented. *Subject Headings:* **1. Wind wave computation 2. Storm surge computation 3. Apsheron, Azerbaidzhan, U.S.S.R.**—*I.L.D.*

12.1–180 551.556.8:532.56

Reid, Robert O., **Modification of the quadratic bottom-stress law for turbulent channel flow in the presence of surface wind-stress.** *U. S. Beach Erosion Board, Technical Memorandum*, No. 93, Feb. **1957.** 33 p. 12 figs., 17 refs., 50 eqs. **DWB.** Reprinted in *Texas A. and M. College. Dept. of Oceanography and Meteorology, Contributions in Oceanography and Me-*

teorology, 3(60–89):227–273, 1955–1957. Issued **1958. DWB**—A generalized formula for velocity profile and bottom stress has been derived and this takes into account the influence of surface stress. The theory applies to quasi-steady flow over a hydrodynamically rough stream bed and makes use of Montgomery's (1943) generalization of the Prandtl-von Kármán mixing length theory where both stress and mixing length are continuous functions of elevation, from the stream bed to the surface. The ratio between the bottom stress and surface stress depends upon the ratio of depth to the bottom roughness scale, generally less than $^1/_{10}$. *Subject Headings:* **1. Bottom stress 2. Wind stress on water 3. Turbulent channel flow.**—*N.N.*

12.1–181 551.464

Montgomery, Ray B. (*Chesapeake Bay Inst., Johns Hopkins Univ., Baltimore*), **Salinity and the residence time of subtropical oceanic surface water.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 143–146. table, 12 refs.) **DLC**—The distribution of salinity over the ocean surface shows subtropical maxima of about 36.5 per mille, which exceeds the prevailing deep salinity (about 34.7 per mille) by a factor of 1 in 20. The thickness of the layer of high salinity is estimated as 200 m. The cause of the maxima is that evaporation locally exceeds precipitation, by about 1 m/yr. The implication of these values is that the residence time of the water in each region of high salinity is of the order of 10 years. *Subject Headings:* **1. Salinity distribution 2. Sea water salinity data.**—*Author's abstract.*

12.1–182 **551.526.64** 551.465:532.593

*Haurwitz, Bernhard (*NYU*); Stommel, Henry (*Woods Hole Oceanog. Inst.*) and Munk, Walter H., (*Scripps Inst. Oceanog., La Jolla*), **On the thermal unrest in the ocean.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 74–94. 8 figs., 7 tables, 11 refs.) **DLC**—Rossby (1937, 38) has argued from theoretical grounds that there should be a great deal of thermal unrest in the deep ocean, partly due to variable wind-stresses associated with storms. Defant (1936, 1950, etc.) has suggested that internal tidal waves are a practically ubiquitous feature of the ocean, and has presented many analyses of rather short series of observations in evidence. As Haurwitz (1954) has indicated, the chief uncertainty involved in all discussions to data has been the result of the series of observations being too short: often only a few days. The purpose of this paper is to present a preliminary analysis of portions of temperature data obtained since Dec. 8, 1954 on two resistance thermometers located on the bottom off Bermuda at depths of 50 and 500 meters, the data being recorded regularly for several years now. The analysis for tidal periods, inertial periods, and shorter periods of the Brunt-Vaisala type is described. *Subject Headings:* **1. Thermal balance of water surfaces 2. Sea temperature data 3. Tidal theories.**—*Authors' abstract.*

12.1–183 **551.551.8**:551.526.6(262.5)

*Ivanova, Z. S., **Koeffitsient turbulentnogo obmena tepla v poverkhnostnom sloe Chernogo moria.** [Coefficient of turbulent heat exchange in the surface layer of the Black Sea.] *Akademiia Nauk SSSR. Morskoĭ Gidrofizicheskiĭ Institut, Trudy*, 13:54–64, **1958.** 12 figs., 4 tables, 5 refs., 3 eqs. **DLC, DWB** (M(055) A313tr)—Using the equation $\frac{\partial T}{\partial t} = \frac{\partial}{\partial z}\left(K_z \frac{\partial T}{\partial z}\right)$, the author determined the variation with depth of the mean annual values of K_z for the upper 50 m layer of the Black Sea. K_z was calculated according to a method based on the analysis of temperature waves in the sea in a vertical direction. The coefficient was calculated on the basis of amplitudes and phase shifts of temperature waves with annual periods, i.e. on the basis of the amplitude and phase shift of the first harmonic in the analysis of temperature by the Fourier method. The coefficients of K_z were calculated for 5 m intervals according to the method of amplitudes and phase shifts of temperature waves and the modified Fyeldstad ormula. Also obtained patterns which exhaust the most probable cases of variation of K_z with depth satisfying the established conditions in which the surface temperature varies according to the law $T_2 = 8.4 \sin 2\pi/\rho$ (ρ = one year expressed in records). The computations showed the best agreement between calculated and observed amplitudes. K_z varied with ncreased depth linearly. Phase shifts did not manifest a good agreement. The variation of the K_z with time of the assumption that it does not vary with depth was computed by means of $K_z=\frac{h^2}{T_{z2t}+T_{z1t}-T_{zt}}$ where h = half of all depths, i.e. $h-z_2-z=z-z_1$. Finally, the mean annual values K_z calculated from the Black Sea Oceanographic Expedition 1923–1926 are presented. The results of the various calculations are presented in tables and graphs. *Subject Headings:* **1. Turbulent heat transfer in water 2. Sea surface temperature variations 3. Black Sea.**—*I.L.D.*

12.1–184 551.556.8:551.465

Ichiye, Takashi (*Woods Hole Oceanog. Inst.*), **On convective circulation and density distribution in a zonally uniform ocean.** *Oceanographical Magazine*, Tokyo, 10(1):97–135, June **1958.** 27 figs., table, 11 refs., 59 eqs. **DLC**—Many oceanographers have worked on oceanic circulation from the point of view of wind driven theory since a pioneer work of HENRY STOMMEL in 1948 and it is generally accepted that the primary cause of upper circulation of the ocean may be wind stresses. However, the importance of thermal or convective circulation, particularly as a main driving force of deep sea circulation, has become confirmed recently (STOMMEL 1957, VERONIS 1957) and also some theoretical works on the subject were published (FERONOFF 1954, LINEYKIN 1955), though the complete understanding of the problem seems to be still difficult, chiefly owing to nonlinearity accompanying the analysis of the motion. The present study aims at obtaining the relationships between circulation and density distribution, considering a simple model of circulation in a meridional section. *Subject Headings:* **1. Ocean current theories 2. Wind driven ocean circulation.**—*Author's introduction.*

12.1–185 551.556.8:551.465

Veronis, G., **Partition of energy between geostrophic and non-geostrophic oceanic motions.** *Deep-Sea Research*, London, 3(3):157–177, April **1956.** 8 figs., table, 8 refs., 30+16 eqs. **DLC**—The present investigation re-examines the problem of the response of the ocean to a transient applied wind stress as previously treated by ROSSBY (1938), CAHN (1945) and BOLIN (1953), but with more general conditions on the duration and strength of the applied stress. The chief interest in pursuing this aspect of the problem is to determine in some detail just how much of the energy imparted to the ocean by the wind stress is absorbed by (long) inertio-gravitational motions, and how much goes into quasi-geostrophic current motions. When momentum is added to the ocean impulsively 74% of the energy goes into inertio-gravitational motions. For an addition of momentum uniformly over a 6 pendulum hour period 51% of the energy is absorbed by the nongeostrophic motions. All but 11% of the energy goes into the geostrophic flow when momentum is added for 12 pendulum hours. The inertio-gravitational motions are almost exclusively confined to the internal mode of behavior of the stratified ocean. It is shown also that the partition of geostrophic energy between the internal and external modes is dependent on the horizontal scale of the flow, a result which agrees with the corrected result of a previous investigation (VERONIS and STOMMEL, 1955). The process of adjustment of the system is studied quantitatively. A simpler (asymptotic) solution is derived which is valid for large values of time in a region confined to the vicinity of the main stream. The accuracy of the solution and the domain of its validity are increased with increasing time. *Subject Headings:* **1. Wind stress energy distribution in ocean 2. Ocean current structure.**—*Author's abstract.*

12.1–186 551.556.8:551.465

Gaul, Roy D. (*U. S. Navy Hydrographic Office, Wash., D. C.*) and Stewart, Harris B., Jr. (*U. S. Coast and Geodetic Survey, Wash., D. C.*), **Nearshore ocean currents off San Diego, California.** *Journal of Geophysical Research*, Wash., D. C., 65(5):1543–1556, May **1960** 20 figs., 5 tables, 10 refs., 4 eqs. **DLW**—Observations of the trajectories of fields of free-drifting current drogues were made off San Diego, Calif., on 103 days. This provided data for statistical analysis of the surface current regime in two nearshore areas separated by the entrance to San Diego Bay. Reduction of the data required corrections for wind drag on the exposed portion of the drogues and for surface current drag on the float system of the subsurface drogues. Corrected subsurface data and surface data at times of low wind speeds were used to determine tidal components. Vector subtraction of tidal currents from total surface currents provided the components of the wind-induced currents. These were then statistically adjusted as derived from the yearly wind distribution, and finally the tidal and wind-induced components were recombined to yield a statistical redistribution of the total surface current. *Subject Headings:* **1. Ocean currents 2. San Diego, Calif.**—*Authors' abstract.*

12.1–187 551.526.64:551.464/5(265)

Ichiye, Takashi (*Florida State Univ.*), **On the deep water in the western North Pacific.** *Oceanographical Magazine*, Tokyo, 11(2):99–110, March **1960.** 7 figs., 15 refs. **DWB, DLW**—The temperatures of deep waters at 4000 m depth to the south of Japan indicate higher values west than east of the ridge. In the Kuroshio region salinity at 1000 m depth which corresponds to the minimal layer is higher west than east of the ridge. Correspondingly, the oxygen at the minimal oxygen layer is higher west of the ridge. The level of no motion in the Kuroshio is estimated as 1000 m to 1200 m from comparison of surface velocity measured by GEK and obtained by dynamic calculation. With such reference level the counter current under the Kuroshio is found to transport almost the same amount of the water as the Kuroshio. It is thought that the counter current may cause formation of the cyclonic vortex along the northern edge of the Kuroshio west of the ridge as well as differences in properties of waters east and west of the ridge. *Subject Headings:* **1. Deep sea temperatures 2. Ocean temperature-salinity analysis 3. North Pacific.**—*Author's abstract.*

12.1–188 551.465(265)

†Sugiura, Jiro (*Hakodate Marine Observ.*), **On the currents south off Hokkaido in the western North Pacific, [Pt. 1].** *Oceanographical Magazine*, Tokyo, 11(1):1–13, Aug. **1959.** table, 37 refs. **DWB, DLC**—The sea area between the Kuroshio main current and southern coast of Hokkaido where three currents (northern branch of the Kuroshio Extension, Oshio cold current, and Tsugarn warm current) mix with each other, shows remarkable variation. These variations of sea conditions exert great influence on the fisheries as well as on the climate of northern Japan. Since Nov. 1949, the research ship "Yushio-Maru" of the Hakodate Marine Observatory, and since March 1954, the research ship "Ryoju-Maru" of the Japan Meteorological Agency, have been investigating this area with improved observation facilities. Based upon the data thus obtained and also the data obtained by ships of the Maritime Safety Agency and other organizations, the present paper outlines the relative volume transport of the currents and describes separately the detailed structure of the three currents. *Subject Headings:* **1. Ocean current variations 2. North Pacific.**—*I.S.*

12.1–189 534.22:551.463

Ivanov, I. D. (*transl.*), **Rasprostranenie zvuka v okeane: sbornik stateĭ.** [Sound propagation in the ocean: a collection of articles.] Moscow, Izdatvo Inostrannoĭ Literatury, **1951.** 214 p. figs., table, eqs. **DLC** (QC225.1857)—A translation into Russian, with faithful reproduction of figures and charts, of 8 articles from U. S. journals dated 1948–1950, on sound propagation in ocean water and use of sound in measuring depth, etc. The respective articles are: 1) Aarons, A. and Yennie, D., **Phase distortion of acoustic pulses obliquely reflected from a medium of higher sound velocity,** *Acoust. Soc. of Am., Jour.*, Vol. 22:231, **1950**; 2) Ewing, M. and Worzel, J., **Long distance sound propagation,** *Geol. Soc. of Am., Mem.*, 27, **1948**; 3) Pekeris, C., **Theory of propagation of sound in shallow water,** *Geol. Soc. of Am., Mem.*, 27, **1948**; 4) Worzel, J. and Ewing, M., **Propagation of acoustical explosion waves in shallow waters,** *Geol. Soc. of Am., Mem.*, 27, **1948**; 5) Liebermann, L., **Reflection of sound from the bottom of coastal waters,** *Acoust. Soc. of Am., Jour.*, Vol. 20:305, **1948**; 6) Liebermann, L., **Reflection of sound from the surface of water,** *Acoust. Soc. of Am., Jour.*, Vol., 20:498, **1948**; 7) Young, R., **Interference of sound rays in the presence of refraction,** *Acoust. Soc. of Am., Jour.*, Vol. 19: **1947**; 8) Anderson, E., **Distribution of sound velocity in a section of the eastern north Pacific,** *A.G.U., Transactions*, 31:221–228, **1950.** *Subject Heading:* **1. Acoustical propagation in sea.**—*M.R.*

12.1–190 551.46.018

Kawamoto, Takeo (*Japan Met. Agency*), **The construction of parachute drogue.** *Oceanographical Magazine*, Tokyo, 10(1):9–12, June **1958.** 2 figs., 4 refs. **DLC**—As a part of the program of the IGY, the subsurface current in the polar front region of the western Pacific was measured with parachute drogue. Here, we report on the construction of a parachute drogue which was used in the present measurement. *Subject Heading:* **1. Parachute drogues.**—*Author's introduction.*

12.1–191 551.46.018.3 551.465:532.59

Reid, Joseph L., Jr. (*Univ. Calif. Scripps Inst. Oceanog.*), **A comparison of drogue and GEK measurements in deep water.** *Limnology and Oceanography*, 3(2):160–165, April **1958.** 4 figs., table, 6 refs. **DLC.** Reprinted as *California. Univ. Scripps Institution of Oceanography, Contribution, 1958*, issued **1959.** p. 226–231. Contribution No. 993. **DWB** (551.46 C153co 1958)—Two series of current measurements made with GEK and drogues are shown to agree closely, not only in the averaged results of three days' data, but in short-period variations about the mean. The variations measured are probably too large to be the ordinary tide, and the possibility of their being the orbital velocities of internal waves is discussed. *Subject Heading:* **1. Current instruments.**—*Author's abstract.*

12.1–192 532.59:551.460.18 (548.3)

Srivastava, S. S.; Narayana Rao, V. and Kartha, T. D. K. (*all, Indian Naval Phys. Lab., Cochin*), **Installation of ocean wave recorder at Trivandrum.** *Indian Journal of Meteorology and Geophysics*, Delhi, 10(3):331–336, July **1959.** 4 figs., 3 refs. **DWB, DLC**—This paper deals with the installation of the Ocean Wave Recorder carried out by the Indian Naval Physical Laboratory. Details of the pressure type of underwater wave recorder, the choice of the site for the installation and the actual details of the installation are dealt with. A brief review of the naval applications of ocean wave studies is also given. *Subject Headings:* **1. Ocean wave recorders 2. Trivandrum, India.**—*Authors' abstract.*

F2. SEA ICE

12.1–193 551.326.7(98)

Thomas, Charles W. (*Dept. of Climatology, Univ. of Washington, Seattle*), **Sub-ice positioning in the Arctic basin.** *Navigation*, Los Angeles, Calif., 6(3):190–194, Autumn **1958.** photo. **DWB, DLC**—The author has pointed out the advantage of drifting stations as scientific observation platforms and the application of information derived from them to sub-ice positioning. Many things have been taken into consideration, such as gravity, explosives, heat flow, sediments and satellites. *Subject Headings:* **1. Sub-ice positioning 2. Arctic.**—*N.N.*

12.1–194 551.326.7:551.322:53

Weeks, Wilford F. (*Dept. of Geology, Wash. Univ.*) and Lee, Owen S. (*U. S. Navy Electronics Lab., San Diego, Calif.*), **Observations on the physical properties of sea-ice at Hopedale, Labrador.** *Arctic*, Montreal, 11(3):135–155, **1958.** 22 figs. (incl. photos), 13 refs. **DLC**—The observations and the data reported on are for the winter 1955–1956 at Hopedale, Alaska. The topics discussed are: formation of the initial ice cover and its salinity; accumulation of sea-ice, its density and crack formation. The formation of infiltrated snow-ice is also considered. The ice formation began with fragile, lateral ice crystal 0.5–2.5 cm wide, 0.1–1 mm thick rubbing shape into pancakes 0.2–4 cm held together by a much of ice crystals. Sheet ice formed usually in calm nights and consisted of horizontal c-axes orientated crystals in diameter <1 mm to 20 cm. Salinity during freezing was 32.7% at -1.8°C. Conclusions are drawn from each topic discussed. *Subject Headings:* **1. Sea ice properties 2. Hopedale, Labrador.**—*W.N.*

12.1–195 551.324.24(99) 551.326.6(99)

Vtiurin, B. I., **Izuchesnie ledianykh beregov i aisbergov v Antarktike.** [Study of ice shores and icebergs in Antarctica.] *Priroda*, Moscow, No. 4:59–63, April **1958.** 3 figs. **DLC**—The author presents the results of a study of the ice coasts of Davis Sea and adjoining areas carried out during the winter of 1956–57 by means of dog teams, airplane and helicopter. Within the boundaries of 74–111° east long. on the coast of Eastern Antarctica the following types of ice formations having independent significance are present: the Antarctic ice cover, shelf glaciers, ice domes with drift glaciers. The Antarctic ice cover consists of an interior ice plateau and a hilly zone which surrounds the interior plateau and has a width from tens to hundreds of kilometers. This is the zone of maximum precipitation and of a less severe climate. In this zone flowing glaciers arise in so-called "ice rivers" with ice "banks" in deep channels under the ice. The texture and structure of the ice cover on the Davis Sea barrier, of the shelf glaciers in eastern Antarctica, of the ice domes and of the drift ice are described with the aid of photographs. *Subject Headings:* **1. Ice formations 2. Davis Sea 3. Antarctica.**—*I.L.D.*

12.1–196 551.508.85

Dremliug, V. V., **O radiolokatsionnoĭ s"emke morskikh techeniĭ i l'dov.** [Radar photographing of sea currents and ice.] *Meteorologiia i Gidrologiia*, Moscow, No. 10:38–39, Oct. **1959.** 3 figs., ref. **DWB, DLC**—Photographs of the radar screen, indicating the time and positions of the radar-spar-buoys and landmarks, are used for the record and surveying of the current and accumulation of ice. Improved method of surveying with superimposed transparent map is described with illustrations. *Subject Headings:* **1. Radar photography 2. Radar photographing of sea currents and ice.**—*N.P.S.*

F3. HYDROLOGY

See also: **Microclimat. of swamps, Estonian S.S.R.** (Maazik), 12.1–407.

12.1–197 551.579 626:061.3(73)

Middleton, Helen K. (*ed.*), **Hydraulic research in the United States 1959 (including contributions from Canadian Laboratories).** *U. S. National Bureau of Standards, Miscellaneous Publication*, No. 227, Oct. 1, **1959.** 188 p. Also: . . . **1960,** issued as *Ibid.*, No. 231, Aug. 5, **1960.** (For previous report, *see* 3.7–155, July **1952,** *Met. Abs.*) **DWB** (532 U58h)—A guide to hydraulic research projects in the U. S. during 1959 compiled from reports by the various hydraulic and hydrologic laboratories in the U. S. and Canada. Names of the contributing laboratories are listed in alphabetical order. The subject index appears at the end listing nearly 200 subjects in the field. The project reports are systematically drawn-up. Each contains information pertaining to: a) number and title of project; b) for whom project conducted, c) correspondent, d) nature of project, e) description, f) present status, g) results and h) publications. *Subject Headings:* **1. Hydraulic research projects 2. Hydrology 3. United States.**—*I.S.*

12.1–198 551.579:061.1(47)

Zolotukhin, A. A., **Zadachi Gidrometeorologicheskoĭ sluzhby v svete resheniĭ XXI s"ezda KPSS.** [Tasks of the Hydrometeorological Service in the light of the resolutions of the 21st Congress of the Communist Party.] *Meteorologiia i Gidrologiia*, No. 4:3–15, April **1959. DWB, DLC**—The author outlines the future program of the Hydrometeorological Service to accomplish the economic plans of the U.S.S.R. Special mention is made of the construction of hydroelectric plants, the fishing industry, aviation industry (special investigations on thunderstorm activity at 6–12 km altitude), agriculture, shipping, etc. The proposed seven year plan for the expansion of services to various branches of the national economy, i.e., extension of networks, and of observations, of meteorology and hydrology, improvement in equipment, in collection and publication of results, extension of research in synoptic meteorology, in cloud physics, climatology, agricultural meteorology, etc. is outlined. *Subject Headings:* **1. Hydrologic services 2. Meteorological services 3. U.S.S.R.**—*I.L.D.*

12.1–199 551.579(477)

†Kaganer, M. S. and Aĭzenberg, M. M., **Kratkiĭ ocherk gidrologicheskikh rabot na Ukraine.** [Brief outline of hydrologic works in the Ukraine.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut*, Trudy, No. 5:55–66, **1956.** 55 refs. **DWB, DLC**—This brief outline includes a catalog of the most important written works dealing with the hydrography and hydrology of the Ukraine, beginning with ancient Greek, Roman, Arabic and Russian descriptions of Ukrainian rivers. The basic trend of Soviet hydrological science was determined by the plan of the country's electrification in 1920 (GOERLO) which inaugurated a

series of important hydrographic studies which are now being supervised by the Ukrainian Scientific Research Hydrometeorological Institute (Ukr-NIGMI), organized in 1953 in Kiev. *Subject Headings:* **1. Hydrology of Ukraine 2. Ukrainian S.S.R.**—*A.M.P.*

12.1–200 551.579:551.482.2:519.241(675)

Bultot, F., **Cotes hygrométriques et débits maxima et minima probables de quelques cours d'eau congolais.** [Water levels, and probable maximum and minimum flow for some Congolese rivers.] *Académie Royale des Sciences Coloniales, Bulletin des Séances,* N.S. 5(4):992–1011, **1959.** 10 figs., 5 tables, 5 refs. **DWB**—The estimate of water levels exceeded and not exceeded, on the average once within 10, 25, 50 and 100 years are established for 25 stations in Congo, by means of Jenkinson's method. The relationships "water level-flow," the monthly and yearly mean flow, the flow for various given frequencies and the flow exceeded and not exceeded on the average once within 10, 25, 50, and 100 years are computed for the stations at Leopoldville, Ponthierville, Kindu, Kutu-Moke and Port-Francqui. Diagrams show the dispersion of the monthly flow around their mean values for each of these 5 stations. Dispersion is characterized by the curves of monthly flow not exceeded in 10, 25, 50, 75 and 90% of cases during the considered period. Dispersion of flow is larger at the time of high water. *Subject Headings:* **1. Hydrometeorology 2. Hydrography of Congolese rivers 3. Probable extreme flow determination 4. Statistical analysis 5. Congo.**—*A.V.*

12.1–201 551.579:551.311.2:631.5(797,796)

Naffziger, L. M. and Horner, G. M. (*both members ASAE*), **Effect of cropping and tillage practices on run-off and erosion in the Palouse area of Washington and Idaho.** *American Society of Agricultural Engineers, Transactions,* 1(1):34–35, **1958.** 6 tables. **DWB**—Most of the runoff and erosion in the Palouse area of Washington and Idaho occur during the nongrowing season as a result of concentration of precipitation during the winter and early spring. The authors of this report discuss the means of controlling erosion in these two states. *Subject Headings:* **1. Runoff regime 2. Erosion 3. Washington (state) 4. Idaho.**—*N.N.*

12.1–202 551.579

Zimont, I. L., **O koeffitsiente stoka.** [The runoff coefficient.] *Meteorologiia i Gidrologiia,* Leningrad, No. 11:18–23, **1958.** fig., 2 tables, 9 refs., 10 eqs. **DWB, DLC**—Since the processes of precipitation, runoff and infiltration are simultaneous the water balance cannot be determined from their discharges; this balance should be determined from the volumes of precipitation, runoff and infiltration. Formulas reflecting the principal factors determining runoff are developed. These are

$$\alpha=\frac{H_tF-i[t+(t_p+t_{sp}-t+t_1)k]F_0}{H_tF},$$

and

$$\alpha=\frac{H_t-i[t+(t_p+t_{sp}-t+t_1)k}{H_t}.$$

These factors are as follows: climatic conditions are represented by H_t (precipitation layer) and i (intensity of infiltration); area of basin = directly and by t_p (time of flood rise in min), t_{sp} = time of flood drop in min, and i; rainfall layer = t_p; rain intensity = i; duration of rain; directly, form and structure of soil = i; form of plant cover = t_p, t_{sp} and k = configuration of basin = k; presence of swamps, lakes, etc. by F_0 (area of basin excluding area of infiltrating); character of channel by t_p and t_{sp}; temperature of soil and air by the parameter

$$k=\frac{F_1+F_2+\cdots+F_{n-1}}{nF_0}.$$

On the basis of experimental data and with the aid of formulas, the author analyzed the effect of these factors upon the runoff coefficient and the error resulting when the formula $\alpha=a-i/a$ is used, where a = intensity of precipitation and i = intensity of infiltration. *Subject Heading:* **1. Runoff coefficient.**—*I.L.D.*

12.1–203 551.579.4551.577.37(282.243.7)(498)

Platagea, Gh. and Platagea, M., **Unele probleme cu privire la determinarea debitelor maxime pluviale pe riurile din R.P.R.** [Problems concerning the computation of floods provoked by rains in the Romanian rivers.] *Meteorologia, Hidrologia şi Gospodarirea Apelor*, Bucharest, 3(1):38–44, **1958.** 4 figs., 10 refs., 20 eqs. Russian, French and English summaries p. 38. **DWB**—The authors study the methods of computing the total volume of floods, starting from an analysis of the torrential rains recorded, and the maximum water discharge in 24 hrs, taking into consideration the original losses. The analysis is based upon records of floods in Romanian rivers, especially in Moldavia. *Subject Headings:* **1. Flood rainfall 2. Excessive rainfall 3. Flood analysis 4. Moldavia, Romania.**—*Authors' abstract.*

12.1–204 551.579.4(764)

Stout, Ivan M. (*Tex. Bd. of Water Engineers, Austin*), **Stream flow and floods in the past twelve months.** *Texas A. and M. College, College Station, Proceedings of the 3rd Annual Conference on Water for Texas, Sept.* 1957, (issued **1958?**). p. 24–30. 6 figs. **DWB** (M79 C748pro), **DLC** (TD201.T37)—The 90-day storm period (April through June, 1957) is discussed specifically. The long duration of the storm is explained as the result of water being fed to the streams at a uniform rate for weeks instead of by sudden bursts that produce high peak discharges. *Subject Headings:* **1. Floods 2. Stream flow 3. Texas.**—*N.N.*

12.1–205 551.501:551.579.4:551.482.2

Nezhikhovskiĭ, R. A., **Ob opredelenii ob"ema vody v rusle reki na mnogopritochnom uchastke.** [Determination of the volume of water in a river channel in a sector where there are many tributaries.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:43–45, **1958.** 4 figs., 9 eqs. **DWB, DLC**—The equations for determining the volume of water in a river channel are given for a sector above the first (counting from the origin) hydrometric post, for a sector, without or with slight inflow, bounded by two hydrometric posts, and for a sector with a tributary. The formula for the latter is $W=\dfrac{(Q_1+Q_2)+Q_3}{2}\tau$ where W=volume of water in mean daily discharge ($W_{M^3}/86400$) at posts (in M^3/sec); τ=time of run (in days). In small rivers the hydrometric posts are situated at uneven distances so that it is difficult to determine τ since the time of run between posts is always different. The average value of τ, namely τ_{mean} is used instead of τ and the determination of τ_{mean} is illustrated. The value τ_{mean} is rendered more precise by weighing it by the magnitude of the discharges at the measuring posts. When the hydrometric posts are not on one isochrone (or equidistant) the channel volume is determined by computing the water discharge on one isochrone by interpolation. This procedure is illustrated with relevant diagrams and equations. *Subject Headings:* **1. River water volume 2. River discharge calculations.**—*I.L.D.*

12.1–206 551.509.329:551.579.4

Poklepa, V. F., **O podzemnom pitanii i metodike prognoza stoka na rekakh severnykh raĭonov Vostochnoĭ Gruzii.** [Underground alimentation and a method of forecasting the discharge of rivers in the northern regions of eastern Georgia.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 67:141–147, **1958.** 3 figs., 3 tables, 4 refs. **DWB**—The discharge of the rivers of the southern slope of the principal Caucasian Mountain Range within eastern Georgia is analyzed by examining the quantity of summer and winter discharge, the store of underground waters in the total discharge and its seasonal variation. The possibility of forecasting summer runoff is considered. The equation of forecasting the total monthly and seasonal runoff can be represented in the form $Q=Q_r+Q_m+Q_u$ where Q_r=rain component, Q_m=melt water component and Q_u=underground component of runoff. The rainfall component is given by $Q_r=X-(1/\alpha)(1-e^{-\alpha x})$ where X=amount of precipitation in mm; α=parameter; e=base of natural logarithm. The monthly forecast of runoff during summer is given by $Q=X-(1/\alpha)(1-e^{-\alpha x})+f(Q_{\min})$. *Subject Headings:* **1. River discharge forecasting 2. River runoff 3. Underground alimentation 4. Eastern Georgia, U.S.S.R.**—*I.L.D.*

12.1–207 551.509.33:551.579.4:551.482.2(472)

Nezhikhovskiĭ, R. A., **Fonovye prognozy stoka rek severo-zapada Evropeĭskoĭ territorii SSSR.** [Basic forecasts of stream flow for rivers in northwestern European U.S.S.R.] *Lenin-*

grad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy, No. 53(107):128 139, **1956.** 7 figs., 5 tables, 7 refs. **DWB** (M(055) M581tr) –A method for preparing basic seasonal forecasts of stream flow for the northwestern European U.S.S.R., an area characterized by numerous lakes, reservoirs and marshes, is described. The river flow for the calendar spring period (April–June) is given by the relationship between stream flow and the totals of spring and summer precipitation. When the individual curves for each locality are plotted on the same graph and as the lake area of the basin increases the slopes increase so that in the lower part they all intersect. A generalization of these curves prepared for every forecast can be used for making basic forecasts for spring stream flow. For the summer-fall stream flow individual monthly forecasts of stream flow must be made. The preparation of the forecast is described with the aid of equations developed by the author (*Moscow. Tsentral'nyĭ Institut Prognozov, Trudy,* 27(54), **1951**). It involves the following steps: preparation of a forecast on the 24–26th day of a given month for the following month; the flow for a given month (H_i) is determined according to each closed basin for which a forecast is made; insufficient data from the 24–26th to the end of the month are determined by extrapolation; on the basis of the regional relationships $k_{i+s}=f(X)$—where h_{+1}=surface inflow into river or lake network of the basin in the subsequent month and $f(X)$=total precipitation for the third decade of the given month and the first decades of subsequent months; the basic forecast of inflow into the river and lake network of the basin for the entire northwestern part of the European U.S.S.R. is constructed; the expected value H_{i+1}, the flow into an adjoining basin, for the following month, is obtained from the map of the basic inflow forecast and equations $H_{i+1}=H_{a\cdot i+1}+ah_{i+1}$ where a=constant and $H_{a\cdot i+1}$=assumed flow curve. The flow forecast for the winter involves determining the relationship between minimum monthly flow for December–March and the fall water content for different percentages of areas occupied by lakes. *Subject Headings:* **1. Seasonal stream flow forecasts 2. River flow 3. Northwest U.S.S.R.**—*I.L.D.*

12.1–208 551.579:626.86(498)

Enescu, G., **Calculul tehnico-economic al sistemelor de desecare.** [Technical economical computation of drainage systems.] *Meteorologia, Hidrologia și Gospodărirea Apelor,* Bucharest, 3(4):44–47, **1958.** 7 figs., 6 refs., 5 eqs. Russian summary p. 76; French summary p. 78 and English summary p. 80. **DWB**—Based on economical considerations, the author presents a method for establishing the flow for which the drainage canals and pumping installations must be computed. A comparison of flood-menaced land and the amount of investments and expenses involved in the realization and operation of the drainage system. The author underlines the conditions under which the Romanian Standards STAS 4063-53 and STAS 4273-54 are applied, in connection with the probability of the flood discharge for which the drainage systems must be computed. *Subject Headings:* **1. Drainage design 2. Romania.**—*Author's abstract.*

12.1–209 551.526.84:551.524.4:536.24

Nesina, L. V., **O vliianii stratifikatsii temperatury na teploobmen v vode.** [The influence of temperature stratification on the heat exchange in water.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* 59(121):37–39, **1946.** 3 eqs. **DWB, DLC** –On the basis of temperature data collected at 5 water reservoirs in European U.S.S.R., Central Asia and Armenia, the author investigated the effect of temperature stratification upon heat exchange. From the equation of heat conductivity of water the equation

$$B=c\rho\int_0^{\mathrm{H}}\frac{\partial T}{\partial t}\,dz+B_b$$

is obtained; B=heat exchange of water, B_b=heat exchange with the bottom, H=depth of the reservoir, T=temperature of water, $c\rho$=total heat capacity of water. In the case of nearly isothermal stratification

$$B'=c\rho\int_0^{\mathrm{H}}\frac{\partial T_s}{\partial z}\,dz+B_b=c\rho\,\frac{H\partial T_s}{\partial t}+B_s$$

where T_s=temperature of the water surface. The ratio of heat exchange in water for a narkedly stratified temperature to heat exchange in isothermal stratification is given by

$$\beta = \frac{c\rho \int_0^H \frac{\partial T}{\partial t}\,dz + B_s}{c\rho H \frac{\partial T_s}{\partial t} + B_s},$$

B_s can be neglected since it is very small. Calculations of β showed that in summer the omputation of heat exchange without considering stratification leads to an error of 30–40% f the heat exchange including stratification. In winter β did not vary more than 0.10. The oefficient β was found to be sufficiently constant in the various regions. For conditions of emperature stratification $B' = \frac{1}{H}\int_0^H \frac{T}{T_s}\,dz$. For relatively shallow reservoirs the heat exhange during the summer can be computed by $H = c\rho k \frac{\partial T_s}{\partial t}$. *Subject Headings:* **1. Temperature tratification 2. Heat exchange air-water surface 3. U.S.S.R. 4. Central Asia 5. Armenia.** —*I.L.D.*

12.1–210 621.311.21:001.57(498)

Răzvan, E., **Unele rezultate ale studiilor de laborator pentru hidrocentrala "V. I. Lenin" e la Bicaz.** [Certain results of the laboratory studies on the hydroelectric station at Bicaz.] *eteorologia, Hidrologia şi Gospodărirea Apelor*, Bucharest, 4(1):53–60, **1959.** 10 figs., 3 refs., eqs. Russian, French, and English summaries p. 78–80. **DWB**—The paper presents the esults obtained on a model (1:25) investigation relating to the downstream consolidation and he local losses of energy at the entry concerning the regulating dam of the "V. I. Lenin" ydroelectric station. This dam is equipped with flap-gates and is used to regulate the water vel at the turbines. As a result of investigations on 35 various dissipators two recomandable solutions from the hydraulic point of view have been indicated as well as the downream berm. Indications on gates operation are also given as well as the pressure diagram the most unfavorable cases. The study also made precision on certain methods of inestigation concerning the downstream consolidation. As a general result the author indicates e maximum admitted divergence for dissipation basins. *Subject Headings:* **1. Hydroelectric ower stations 2. Bicaz, Romania.**—*Author's abstract.*

12.1–211 551.482:628.543:669.163

Săndulescu, M.; Anghel, V. and Tainer, L., **Epurarea apelor reziduale industriale la ombinatul metalurgic Reşiţa.** [Treatment of industrial waste water from the metallurgical orks in Reşiţa.] *Meteorologia, Hidrologia şi Gospodărirea Apelor*, Bucharest, 4(1):60–64, **959.** 4 tables. Russian, French and English summaries p. 78–80. **DWB**—The present ork was done with the aim of establishing the parameters necessary for planning the treatment ations of the waste water coming from the various sections of the metallurgical works in the wn of Reşiţa. In order to plan only the strictly necessary equipment, the waste effluent well as the waters of the Birzava River were analyzed to find out the capacity of self-treatent. With the help of chemical analyses, the type of treatment equipment and its efficiency ere established for rivers mentioned in the Romanian Standard (STAS 4706-55). *Subject eadings:* **1. Industrial waste water 2. Birzava River.**—*Authors' abstract.*

F4. GLACIOLOGY

See also: **Ice reconnaissance,** 12.1–14; **Glaciation, Mt. Olympus** (LaChapelle), 12.1–390.

12.1–212 551.583.7:539.16:546.26:550.9

Gigout, Marcel, **Ages, par radiocarbone, de deux formations des environs de Rabat aroc).** [Radiocarbon dating of two formations in the vicinity of Rabat, Morocco.] *cadémie des Sciences, Paris, Comptes Rendus*, 249(25):2802–2803, Dec. 21, **1959.** 3 refs.

DWB, DLC—Determination of the absolute age, using the radiocarbon method applied to shells found in the sand of the beach +2 at Miramar. The sea level +2 m on the Moroccan coast should date back 6000 years, as the Flanders episode of Calais, the Winkles Sea of northern Europe, and should coincide with the climatic optimum in Europe which dates back about 4000 years B.C. This climatic optimum period gently warmer and drier than the present state, is considered to be responsible for the transgression of the Winkles Sea or episode of Calais in the middle Flandrian. The terminal deposit of rharbian alluvium in the Bou-Regreg estuary should date from the XIIth century and the ulterior hollowing could have an anthropic cause. It is thought that the wear and tear of grass-lands, forests and soils results from the spreading of nomadism. *Subject Headings:* **1. Radiocarbon dating 2. Glacial deposits 3. Miramar Beach, Morocco.**—*A. V.*

12.1–213 551.583.3:581.33(492)

Teunissen, D., **Over een pollenhoudende kleilaag in het "Zweiersdal" te Oosterbeek.** [A pollen-containing clayey strata in the "Zweiersdal" valley, at Oosterbeek.] *Nederlandsch Aardrijkskundig Genootschap, Amsterdam, Tijdschrift,* 74(3):211–218, July **1958.** 3 figs., 13 refs. **DGS, NN, DLC**—In the subsoil of the village of Oosterbeek, near Arnhem (Netherlands), was found a layer of clay lifted through the pressure of the glaciers of the Pleistocene age. The clay contained pollen of Chenopodia; this indicating the nearness of the sea during the sedimentation of the clay. This conclusion has been corroborated by the presence of chitinous foramina, for these are bound to a coastal facies. Moreover, the clay contained pollen of Tertiary vegetation. From this may be inferred that the clay was formed at the beginning or middle of the relatively warm age, between the glacial ages of the "Danube" and of the "Günz." *Subject Headings:* **1. Pollen analysis 2. Glacial ages 3. Oosterbeek, Netherlands.**—*A. V.*

12.1–214 551.583.3:551.332(494)

†Hantke, René, **Zur Altersfrage der Mittelterrassenschotter: die riss würm-interglazialen Bildungen im Linth/Rhein-System und ihre Äquivalente in Aare/Rhone-System.** [The age of the rocky terraces: interglacial formations in the Linth/Rhine system and its equivalent in the Aare/Rhone system.] *Naturforschende Gesellschaft, Zurich, Vierteljahresschrift* 104, Abhandlung 1, March 1, **1959.** 47 p. 6 figs., table, bibliog. p. 41–47. **DLC**—A good detailed study of geological events in Switzerland during the Quaternary period. The first part of the article describes the formation of the Linth/Rhine system and comments on the borings at Tuggen and in the Limmattal. The second part deals with the formation of the Aare/Rhone system: 1) the Bern-Biel-Olten part and 2) S. of Bern. The object of the author is to show the similarity between the formation of these two systems. The article ends with a good comparison. *Subject Headings:* **1. Climatic changes 2. Quaternary period 3. Interglacial formation 4. Linth-Rhine system, Switzerland 5. Aare/Rhone system, Switzerland.**—*A. V.*

12.1–215 551.583.3:551.311.31

Faure, Hugues, **Sur quelques dépôts du Quaternaire du Ténéré (Niger).** [Some Quaternary deposits of the Ténéré, Niger.] *Académie des Sciences, Paris, Comptes Rendus,* 249(25):2807–2809, Dec. 21, **1959.** 5 refs. **DWB, DLC**—Sand-hill, river and lake formations, erosion phases and lithic formations prove a succession of wet and arid periods during the Quaternary era in the Ténéré Desert. The expressions "wet period" and "dry period" are perhaps only valid between certain boundaries corresponding to climatic zones spaced out from north to south. It is the expansion or the swaying of these zones that seems to be responsible for the nature of the deposits during the Quaternary. *Subject Headings:* **1. Quaternary climates 2. Quaternary period 3. Sand-hill formations 4. Ténéré Desert, Niger.** —*A. V.*

12.1–216 551.583.3:551.338 551.324.63

Matschinski, Matthias, **Mécanique des glaciations et décalage des glaciations des hémisphères Nord et Sud.** [Glaciation mechanism and glaciation lag in the Northern and Southern Hemispheres.] *Académie des Sciences, Paris, Comptes Rendus,* 249(25):2815–2817, Dec. 21, **1959.** 2 refs. **DWB, DLC**—Review of the characteristic magnitudes taken into account in the general glaciation theory. Temperature is a difficult and almost unemployable magnitude; one would rather choose as characteristic, the magnitude of the ice masses on the surface of the globe, as ice is easily transformed to water masses under other forms. These forms ("phases," "states") are: mass of water in the hydrosphere, mass of water in the atmosphere and mass of the water chemically combined and of the crystalline water in minerals. The author gives a linear form to the fundamental equations of the glaciation theory and provides the solutions of these fundamental equations in the case where the glaciations of the northern and southern hemispheres are considered separately. It is found that: 1°) a lag φ between the glaciations of the two hemispheres is inevitable and 2°) the glaciations never reach the compensation stage. *Subject Headings:* **1. Glaciation theories 2. Climatic changes 3. Dissymmetry between hemispheric glaciations.**—*A.V.*

12.1–217 551.324.5(08) 551.326(08)

International Union of Geodesy and Geophysics. Association of Scientific Hydrology, **Symposium de Chamonix, Sept. 16–24, 1958: Physique du mouvement de la glace.** (Chamonix Symposium, Sept. 16–24, 1958: Physics of the movement of the ice.) Its *Publication,* No. 47, pub. Gentbrugge, **1958,** 394 p. figs., tables, bibliogs., eqs. (For listing of contents, *see* Pt. III, p. 1609, Oct. 1959, *Met. Abstracts.* All papers abstracted separately.) **DWB** (551.311 I611sy). *Subject Heading:* **1. Ice movement symposia.**

12.1–218 551.321.6:551.524.3

Cagniard, L. (*Laboratoire de Géophysique Appliquée, Faculté des Sciences, Paris*), **Abaque pour sondages électriques sur glace.** [Nomograph for electric soundings of ice.] *Annales de Géophysique,* Paris, 15(4):561–563, Oct./Dec. **1959.** fig., 4 refs., 4 eqs. **DLC**—In an electric sounding of ice, the apparent resistivity may be greatly modified by the thin, conducting, humid superficial layer. The results of the calculation of this effect are presented in the form of a bilogarithmic nomograph, essential in interpreting an electric sounding on ice. *Subject Headings:* **1. Glacier thickness measurement techniques 2. Electric sounding of ice.** —*A.V.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **IGY Antarctic stations** (Flowers), 12.1–22; **Met. research stations** (Askhaev, Egorov), 12.1–29; **Radio echoes from meteors** (Forsyth), 12.1–128; 12.1–129; **High frequency direction finder** (Wolfe), 12.1–153; **River discharge calculations** (Nezhikhovskiĭ), 12.1–205; **International unit of absolute temp.** (Bodea), 12.1–240; **Lvov air weather station** (Bershchanskiĭ), 12.1–260; **Radar echoes from precip.** (Lhermitte), 12.1–384; **Snow density calculation** (Rudometov), 12.1–392.

12.1–219 551.501.4 551.582.3

Vilkner, H., **Darstellung von Klima-Elementen mittels "Laufender" und "Psychologischer" Kurven.** [Representation of climatic elements by means of "running" and "psychological" curves.] *Zeitschrift für Meteorologie,* Berlin, 12(9/10):296–306, Sept./Oct., **1958.** 4 figs., 4 refs., 12 eqs. **DWB, DLC**—The author shows by means of examples that in the graphic representation of climatic elements moving averages, which are to give continuing information regarding past time frequently do not coincide in the curve with the physical, biological, or psychological effects of the represented climatic element. Instead curves are desired that run steeply and then decline slowly and evenly. Such curves are especially suitable for hydrological, agrometeorological and phenological representations. Owing to their similarity with human psychological behavior these curves are termed "psychological curves." The slow and even decline of the curves is attained by multiplying all observed values in successive days by f, f^2, f^3, etc.; the factor f is smaller than unity so that f^i converges for increasing i to zero. The value f determines finally the measure of the diminution; f must be in a definite relationship to n, i.e. $f=n-i/n$, if the curve is to be representative for a number of *n*-days. Formulas are presented for the psychological curves and these are compared with running curves. Also the construction of raised curves is described and illustrated. Specific examples of the computation of psychological curves including tables and graphs are presented. *Subject Headings:* **1. Graphical presentation 2. Climatic charts.**—*I.L.D.*

12.1–220 551.501.45:519.241.1

Kozik, S. M., **O privedenii riadov.** [Reduction of series.] *Tashkent. Geofizicheskaia Observatoriia, Trudy,* No. 11/12:71–74, **1956.** 3 eqs. **DLC**—A theoretical discussion of the best method of reduction of series. When the coefficient of regression is close to a unit, the method of differences gives the best possible results. If it differs considerably from a unit, the results will not be satisfactory. If the tropopause gets between the series, reduction is useless. *Subject Headings:* **1. Reduction methods 2. Series reduction.**—*A.M.P.*

12.1–221 551.501.75:551.508.5:551.510.42

McCormick, R. A. (*Robert A. Taft Sanitary Eng. Center, Cincinnati*), **Wind and turbulence instrumentation for air-pollution surveys.** *American Meteorological Society, Bulletin,* 41(4): 175–179, April **1960.** 7 refs. **DWB**—Significant requirements in wind-instrumentation or -measurement techniques are briefly reviewed with respect to the operational or research function in which they are employed. It is concluded that sensing devices can be obtained or have been devised which are, in principle, satisfactory for the field investigation of most practical and many theoretical problems arising in air-pollution studies. However, devices for rapid output-data reduction, transformation, or manipulation in a form to be of greatest utility are badly needed, preferably as integral parts of the wind-instrumentation setup itself. Progress in developments in this direction is reported and future needs pointed out. *Subject Headings:* **1. Wind measurement techniques 2. Wind instruments 3. Atmospheric pollution surveys.**—*Author's abstract.*

12.1–222 551.501.774:551.508.74 551.574.41

†Robison, William C., **Measurement and significance of dew.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Research Study Report RER*-28, Sept. **1959.** 16 p. fig., 30 refs. **DWB** (M86 U585re)—Dew is a micrometeorological phenomenon that has been studied sporadically in many countries. As yet, however, methods of measuring amounts of dew at observing stations have not been standardized on a world basis or within the United States. For laboratory study, drosometers based on the difference in weight of a receptor before and after exposure are most suitable, and are often used in conjunction with a recording cylinder. For observations at field stations, an optical method such as that developed by DUVDEVANI has considerable advantages. Conditions favorable for dew formation are a clear sky, absence of air movement, and a radiating surface that loses heat rapidly. The amount of dew formed increases with the area of the radiating surface; thus a greater amount of dew is likely to condense on leafy vegetation than on a comparable open site. Generalizations as to the geographical distribution of dew cannot be made with certainty from the data now available. Measurements of the total annual amount of dew condensed vary widely according to local conditions and the method of observation. Although the total amount may be larger in some humid regions, dew constitutes a greater percentage of the total moisture received in certain arid and semiarid regions. In some places it may contribute significant amounts of moisture for agricultural and domestic use. *Subject Headings:* **1. Dew measurement techniques 2. Drosometers 3. Dew.**—*Author's abstract.*

12.1–223 551.501.8:532.51:523.51

†Davies, J. G. and Lovell, A. C. B. (*both, Jodrell Bank Experimental Station*), **Radio echo studies of meteors.** (In: Beer, Arthur (*ed.*), **Vistas in astronomy.** London, Pergamon Press, **1955.** Vol. 1:585–598. 12 figs., 51 refs., 5 eqs.) **DLC** (QB3.B35)—A description is given of the radio-echo techniques for the study of meteors. Particular attention is given to those which are relevant to the work on the astronomy of meteors, such as methods for the de-

termination of meteor radiants and velocities. The discovery and elucidation of the complex series of day-time meteor streams is described as an illustration of the ability of these methods to work under conditions when photographic and visual observations are impossible. A short account is also given of the work on the interstellar meteor problem which has resolved the uncertainty as to whether the sporadic meteors are members of the solar system or come from interstellar space. Brief reference is made to the use of the radio techniques in meteor physics. *Subject Headings:* **1. Radio echoes from meteors 2. Radio meteor observation techniques 3. Meteor velocities.**—*Authors' abstract.*

12.1–224 551.501.8:551.521.32

Tanaka, Haruo and Kakinuma, Takakiyo, **On the substitution measurement of sky temperature at centimetre waves.** *Nagoya. University. Research Institute of Atmospherics, Proceedings*, 1:85–88, Jan. **1953.** 3 figs., 6 refs., eqs. **DWB**—Replacing an antenna pointed toward the sky with a "hot load" at 300°C temperature indicated that at 8 cm the sky temperature was between 0° and 5°K. It was not possible to substitute a source at temperature equivalent to that of the sky, so the curve of input was determined by extrapolating the high temperature curve downward. Errors due to substitution and to calculations based on the square-low response and to reversing the signal phase or reference voltage in the low frequency range are discussed. *Subject Heading:* **1. Sky temperature measurement techniques.** -*M.R.*

12.1–225 551.501.81:523.5

Keay, C. S. L. (*Physics Dept., Canterbury Univ. College, Christchurch, N. Z.*), **Meteor radiant determination from high echo-rate observations.** *Australian Journal of Physics*, Melbourne, 10(4):471–482, Dec. **1957.** 8 figs., 2 tables, 8 refs., 6 eqs. **DLC**—A simplified analysis is given of the Clegg method for delineating meteor radiants from radar observations. A further analysis reveals a new and faster method of interpreting the data contained in meteor echo records. This method is applicable when sensitive equipment is employed and the esulting echo rate is very high. *Subject Headings:* **1. Meteor radiant determination 2. Radar echoes from meteors.**—*Author's abstract.*

12.1–226 551.501.81:551.577:621.398

Soltow, Dewey R. and Tarble, Richard D. (*both, U. S. W. B., Wash., D. C.*), **The use of a adar beacon for telemetering precipitation data.** *Journal of Geophysical Research*, Wash., D. C., 64(11):1863–1866, Nov. **1959.** 4 figs., 4 refs. **DLC**—In many regions of the U. S., he lack of observers and other factors prevents the obtaining of precipitation reports from reas repeatedly subjected to flooding. To overcome these difficulties it has been necessary o resort to remote telemetering devices to obtain hydrologic data, such as precipitation, river tage, and tide stage. A method of using the radar beacon for collecting and displaying ipping-bucket raingage data on the PPI scope of a radar is presented in this paper. Applicaions of this beacon to other hydrologic data collections are indicated. *Subject Headings:* **. Radar applications 2. Telemetering systems.**—*Authors' abstract.*

OBSERVATIONAL DATA

See also: **Phenological services,** 12.1–30; **Phenology of the coffee shrub** (Pagacz), 12.1–58.

12.1–227 551.506.1(493)

*Belgium. Institut Royal Météorologique, **Annuaire climatologique pour 1958.** [Climaological Yearbook for 1958.] Its *Publications, Serie A*, No. 12. Issued Brussels, **1960.** 4 p. chart, numerous tables. **DLC**—This yearbook consists of two parts. The first ontains the monthly data on the principal meteorological factors of 6 synoptic stations and the luviometric data from about fifty stations spread over the different natural regions of the ountry. The second part contains the daily hour-values or daily two-hour values of the rincipal meteorological factors for Uccle. *Subject Headings:* **1. Climatological yearbooks . Belgium.**—*A.V.*

12.1–228 551.506.1:551.577.2(569.4)
*Israel. Meteorological Service, **Annual Rainfall Summary, 1955/1956.** Its [*Publications*], *Ser. B*, No. 9/R, issued Hakirya, **1956.** 11 p. charts and tables. In Hebrew and English. **DWB.** Also: **Annual Rainfall Summary, 1957/1958.** Its [*Publication*], *Ser. B* No. 11/R, issued Hakirya, **1958.** 12 p. 2 maps (in color), tables. In English and Hebrew **DWB, DLC**—Two reports for the years 1955–56 and 1957–58 of annual precipitation in Israel The text summarizes the rainfall from month to month. For the year 1955–56 annual amounts of rainfall at several places in the Negev and in Wadi Arabia, are tabulated. Maps are included showing annual rainfall in percent of normal rainfall and minimum and maximum amounts. Monthly amounts of precipitation as compared with 1950–51 average values and as compared with the 1921–50 average values are graphically represented. The statistics of daily precipitation are tabulated. The same information is supplied for the year 1957–58. *Subject Headings:* **1. Annual rainfall summaries 2. Israel.**—*I.S.*

12.1–229 551.506.1:551.582.2(569.4)
*Israel. Meteorological Service, **Annual Weather Report, 1957.** Its [*Publications*], *Ser. B*, No. 120/W, **1958.** p. 97–116 (continuing the *Monthly Weather Reports*, **1957**). map, tables. In English and Hebrew. **DWB, DLC**—The text discusses the weather of each month, particularly with respect to temperature and precipitation. The annual data tabulated refer only to meteorological stations which operated throughout the year 1957. Mean values of different weather elements, extremes and frequencies of the year are tabulated. Also tabulated are frequencies of wind directions, mean pressures, monthly values of climatic elements at Lod airport, annual values of evaporation and departures from the average for the period 1940–49. Statistics for precipitation, relative humidity are also graphically represented. *Subject Headings:* **1. Annual climatic data summaries 2. Israel.**—*I.S.*

12.1–230 551.506.1:551.582.2(494.42)
*Ruche, J., **Résumé météorologique de l'année 1959 à Genève.** [Weather summary for the year 1959 at Geneva.] *Geneva. Observatoire, Publications, Ser. M*, No. 34, **1960.** 13 p. 2 figs., tables. **DLC**—Climatological survey of the year 1959 at Geneva. The years 1947 and 1959 were the hottest of this century. 1959 was a relatively dry year (no precipitation was observed in February) and sunny. 2042 hrs of sunshine (norm.: 1960 hrs) were recorded. Tables indicate the mean and extreme values, both monthly and seasonal, of temperature, pressure, humidity, precipitations, sunshine duration, winds frequency and numbers of days with thunderstorms and fog. Other tables reproduce the daily values of these elements as observed at the observatory of Geneva. *Subject Headings:* **1. Annual meteorological data summaries 2. Geneva, Switzerland.**—*A.V.*

12.1–231 551.506.1:551.582.2(492) 551.577.38(492)
Ten Kate, H., **1959 was zeer zonnig en droog.** [1959 was very sunny and dry.] *Hemel en Dampkring*, The Hague, 58(3):76–79, March **1960.** table. **DWB, DLC**—The year 1959, with 5½ months of summertime, was very sunny, dry and warm and was the opposite of the year 1958. Dryness was remarkable (536 mm rain for normally 719 mm); only 1921 was dryer. Only the month of January presented a precipitation surplus. January showed 18 snow days, it was exceptional. Temperature was above normal value: 10.1° (norm.: 9.2°); 37 summerdays (norm.: 24), 55 frost days (norm.: 67). July the 9th was the warmest day (36.6°), February was the coldest month. Sunshine was most abundant: from 1869 hours at Eelde to 1986 hours at Helder. High pressure was very frequent over North sea blocking the arrival of low pressure and winds from the West. Winds have been mostly between N and E. *Subject Headings:* **1. Annual weather summaries 2. Annual climatic summaries 3. Drought 4. Netherlands.**—*A.V.*

12.1–232 551.506.3:551.582.2(569.4)
Mané, K. U., **Climate of the Negev in the light of new measurements.** (In: Israel. Meteorological Service, **Book of ten years of the Meteorological Service of Israel.** Tel Aviv, **1958.** p. 25–36. In Hebrew. 4 figs., table, ref. **DWB** (M(06) 185se)—The first meteoro-

logical observations of the Negev were made in 1869 at Gaza. In 1931 systematic observations were made at Beer Sheba. During the mandatory period additional stations for this purpose were set up in the Negev. The network of stations was widened following the establishment of the Israeli State. At present 20 climatological stations and 60 rainfall stations are in operation in the Negev area. In addition 40 rain collectors are also in use. The present article reports and graphically presents a survey of the different climatological features of this area. First, the average annual rainfall is given and tabulated (Fig. 1). Then temperature mean —maximum and minimum diurnal in centigrades—of four areas of the Negev is reported. Further, equations for determining continentality vs. maritimality (Table 1) are given. Continentality of 3 different areas is graphically indicated (Fig. 3). Finally, average relative humidity in percentages (Table 2) and wet cooling power (Fig. 4) are presented. *Subject Headings:* **1. Observational data 2. Climate of Negev, Israel 3. Negev, Israel.**—*I.S.*

12.1–233 551.506.7:519.241.6

McRae, J. N. (*Bureau of Met., Melbourne*), **Means and standard deviations of temperature ressure and density at constant height.** *Australian Meteorological Magazine*, Melbourne, No. 25:46–58, June **1959.** 2 figs., 6 tables, 4 refs., 9 eqs. **DWB**—Generally statistics derived rom radio-sonde observations relate to standard pressure surfaces. Occasionally they are equired for particular heights. Equations are given whereby statistics for geopotential eights can be derived from those relating to pressure surfaces. Limited tests of these equaions indicated that they give values close to those obtained from daily values at constant eight. Also, where great accuracy is not necessary, the tests suggest that standard deviations f temperature and pressure for particular heights can be interpolated from the standard eviations at constant pressure. *Subject Headings:* **1. Pressure reduction 2. Upper air ressure computation.**—*Author's abstract.*

INSTRUMENT CARRIERS

See also: **Sec. D3**, p. 42; **Aircraft weather reconnaissance,** 12.1–46; **Airplane investigations** (Helliwell), 12.1–290.

12.1–234 551.507.3:551.553.1

Angell, J. K. (*Special Projects Section Office of Meteorological Research, U. S. W. B.*), **ransosonde flights for December, January and February 1957–58.** Wash., D. C., U. S. Veather Bureau, April **1958.** 3 p. 37 figs., 2 tables, ref. Also: **December, January, and ebruary, 1958–1959.** Issued April **1959.** 33 p. (Mimeo.) numerous figs. and charts, tables, 4 refs. Also: **March and April, 1959.** Issued June **1959.** 25 p. (Mimeo.) almost ntirely charts, 5 refs. Note: This research was sponsored by the Bureau of Aeronautics and Naval Res. Lab. in connection with a transosonde problem. "MS." **DWB** (M07.321 U587tr) —Tracks of transosonde at 300 mb released at Iwakuni, Japan are shown individually and by onths for Dec., Jan., and Feb., 1957–58. Flights were limited to 5 days to avoid flying over urasia. During Dec. flights were concentrated in a narrow band near the Canadian Border, fter reaching the U. S. In Jan. the dispersion was much greater. Mean vector winds of 35 knots show up east of Japan (for 6–18 hrs after release average speed was 121 knots). ummary and analysis of transosonde trajectories across the Pacific and occasionally across orth America during Dec. 1958–Feb. 1959 inclusive from release point in Japan are given. ndividual trajectories with locations and speeds every 6 hrs and composite monthly charts of ajectories positions and diurnal winds (for 608 positions) for Dec., Jan. and Feb. are included the illustrative material. All told, 86% of flights released from Japan were tracked for least 1 day. Average wind speed was 81 knots and 4% of flights had winds >150 knots t 250 mb). *Subject Headings:* **1. Transosonde flight trajectories 2. Transosonde diurnal inds 3. 300 mb planetary winds 4. North Pacific.**—*M.R.*

12.1–235 551.507.3:551.509.317(265/266)

Mastenbrook, H. J. (*Aerology Br., Atmos. and Astrophy. Div., U. S. N. R. L., Wash., . C.*), **Utilization of transosonde data.** *U. S. Naval Research Lab., NRL Report*, 5310, May

18, 1959. 10 p. 5 figs., photo. **DWB**—The Navy transosonde system has been installed in the Pacific area on an operational basis and provides currently a trajectory form of meteorological data for utilization in the analysis of this region. Transosonde flight 202 has been examined in terms of its contribution to the analysis of the 250-millibar pressure surface. Consideration was based upon a careful study of the sequence of map analyses prepared by the National Weather Analysis Center for the period of this flight. Flight 202 is observed to have provided a more or less zonal sweep of the Pacific, defining the major configurations along the flight path. The effect was to pin-point the major features of the circulation on the appropriate synoptic charts and to provide a general firming up of the analysis throughout the entire zone of the trajectory sweep. **Problem status.** This is an interim report on one phase of the problem; work on this and other phases is continuing. *Subject Headings:* **1. Transosonde data utilization 2. Pacific Ocean.**—*Author's abstract.*

12.1–236 551.507.321:532.59

Kao, S.-K. (*Dept. of Met., Univ. Calif.*), **Nonlinear oscillations of a particle in a long wave in a rotating fluid.** *Journal of Geophysical Research*, Wash., D. C., 65(1):279–286, Jan 1960. 2 figs., 13 refs., 26 eqs. **DWB, DLC**—The effects of a long wave of finite amplitude on the oscillation of a particle in a rotating fluid are examined by solving the Lagrangian equations of motion. It is shown that the motion of the particle is nonoscillatory or oscillatory, depending respectively on whether the forcing frequency kUr is equal to the multiples of the natural frequency or not. In the former case, the zeroth-order solution consists of the natural and forcing frequencies, whereas the first-order solution gives three new frequencies. In the latter case, the zeroth-order solution consists of the natural frequency with linearly growing amplitude, whereas the first-order solution gives a high frequency oscillation of twice the natural frequency with linearly growing amplitude. A comparison of the frequencies predicted by the zeroth-order and first-order solutions and those calculated from the trajectories of 300 mb constant-pressure balloons is made. *Subject Headings:* **1. Constant level balloons 2. Wave motion.**—*Author's abstract.*

12.1–237 551.507.321.2

Reshetov, V. D. (*Central Aerological Obs., Moscow*), **Die Präparierung der Ballone zur Erreichung grosser Höhen.** [Preparation of balloons to attain great heights.] *Zeitschrift für Meteorologie*, Berlin, 12(1/2):50–52, Jan./Feb. **1958. DWB, DLC**—In the first four months of 1955 the balloons sent aloft by the Central Aerological Observatory in Moscow reached 29,390 m. This success is attributed to use of special methods (using benzine or petroleum). Treatment in preparation for winter half year (and nights in warm half year) differ from that of days during summer months. The equipment and materials to be used for similar success, the method of preparation and fundamental safety rules are itemized. *Subject Headings:* **1. Balloon launching 2. High altitude balloons.**—(Transl. of manuscript from author.) *E.Z.S.*

INSTRUMENTS

See also: **Far ultraviolet spectrographs** (Robin, Robin), 12.1–111; **Solar spectrographs** (Laborde et al.), 12.1–112; **Solar radio noise equipment** (Tanaka et al.), 12.1–113; 12.1–114; **Radio telescopes** (Christiansen, Mathewson), 12.1–135; **Radar photography of sea currents and ice** (Dremliug), 12.1–196; **Wind instruments** (McCormick), 12.1–221; **Drosometers** (Robison), 12.1–222; **Radiosonde chem. measurement** (Brown, Lavin), 12.1–288; **Grating spectrometers** (Hadni et al.), 12.1–315.

12.1–238 551.508.21:06.045(494)

Mörikofer, W., **Comparisons of radiation instruments.** *World Meteorological Organization, WMO Bulletin*, 8(4):203–204, Oct. **1959.** photo. **DWB**—A note on international comparisons of working standard pyrheliometers of different countries, carried out, in accordance with a decision of the WMO Executive Committee in 1957, in Aug. and Sept. 1959 at the Physical-Meteorological Observatory, Davos, Switzerland, under the auspices of the Working Group on Radiation Measurement of the WMO Commission for Instruments and Methods of Observation. 13 countries and several interested specialized institutions participated in the investigations. Some details of investigations, aims and results are discussed. *Subject Headings:* **1. Pyrheliometer comparisons 2. WMO. Instruments and Methods of Observation Commission 3. Davos, Switzerland.**—*I.S.*

12.1–239 551.508.93:551.521.32

Riblet, Jean, **Rayonnement du "Ciel Bleu" des Préalpes de Provence: Détermination de la répartition des luminances sur la totalité de la voûte céleste au moyen d' "Isophotes" tracées directement au Photometre Inscripteur Riblet.** [Radiation of the "blue sky" of the Alpine foothills of Provence: determination of the luminous distribution of the entire sky by means of isophotes recorded directly by Riblet's recording photometer.] *Germany. Deutscher Wetterdienst, Berichte,* 8(54):275–279, **1959.** 7 figs., 12 refs. French, German and English summaries p. 275. **DWB, DLC**—Observations of the distribution of the "brightness" over the whole sky, though being important features of the radiation from the sky, have rarely been made, owing to the lack of instruments specially adapted to it. The "Riblet recording photometer" follows the same principles as the "Riblet stereographic perspectrograph" used before for determination of the maximum duration of sunshine. The extremely simple instrument makes it possible to draw quickly in a continuous line, "isophote" curves of equal "luminance" and "polarization" in stereographic projection. Results are given of measurements obtained in blue, green and red light, over the entire sky at the Haute-Provence Observatory of Centre National de la Recherche Scientifique (France). *Subject Headings:* **1. Photometers 2. Sky brightness measurement techniques.** -*Author's abstract.*

12.1–240 551.508.71 551.501.3:551.524

Bodea, F., **La balance thermique, thermomètre étalon M. K. S.** [The thermal balance, standard M. K. S. thermometer.] *La Revue Scientifique,* Paris, 90(2):20–26, April/June **1954,** (issued **1960**). fig., 3 tables, 3 refs. **DLC**—The thermal balance is a combination between a Kelvin thermometer and a plate balance, in which the arms have been replaced by a mercury filled tube. A figure shows schematically the apparatus of which the main parts are described. A statement of its principle and aim is given. The thermal balance is intended to be used as a universal and absolute standard thermometer. It may lead to the development of a M. K. S. absolute unit of temperature which would greatly simplify the international regulations on the thermometric scale. This instrument may also be used for the determination of the specific heat coefficient, and also of molar entropy variations. The author recalls the theoretical bases of the M. K. S. A. system and describes in a detailed manner the functioning of the thermal balance as a calibration thermometer. After showing the possibility of making measurements of specific heat and of molar entropy, it is stated that a real interest exists for the adoption of this instrument as a standard thermometer and for international use of the M. K. S. unit of absolute temperature: (1 joule/10^{21} thermal particles) for which the name "Carnot" is suggested. *Subject Headings:* **1. Standard thermometer 2. International unit of absolute temperature.**—*A.V.*

12.1–241 551.508.26

Sobíšek, Bořivoj, **O nepřesnostech při měření vlhkosti a teploty vzduchu Augustovým psychrometrem.** [Inaccuracies in measurement of humidity and air temperature with the August psychrometer.] *Meteorologické Zprávy,* Prague, 12(6):225–228, **1959.** 4 tables, 3 refs., 5 eqs. Russian and English summaries p. 225–226. **DWB, DLC**—The article discusses the errors of air humidity and temperature measurements given by the nonventilated psychrometer which is located in a normal meteorological screen. It also deals with the advantages of the Assmann psychrometer which eliminates most of the errors of the August psychrometer. *Subject Headings:* **1. Assmann's psychrometer 2. August's psychrometer.**—*From author's summary.*

12.1–242 551.508.43:551.541 531.787.6:531.788

Drawin, Hans-Werner, **Über die Verwendbarkeit des Kapazitäts-Mikromanometers als Absolutdruck-Meszinstrument.** [Use of the capacity-type micromanometer as an instrument for absolute pressure measurement.] *Zeitschrift für Instrumentenkunde*, Brunswick, 68(1):1–8, Jan. **1960.** 2 figs., 3 tables, 17 refs. German, English, French and Spanish summaries. **DLC**—The capacity-type micromanometer, working on the principle of electrostatic pressure compensation, can be used as a vacuum meter in the pressure range of 10^{-5} to about 1 mm Hg, if one side of the membrane is kept at a high vacuum ($p \leqq 10^{-6}$ mm Hg). The theory shows that absolute pressure measurements, independent of the type of gas, can be made without previous calibration by another pressure measuring instrument, because the apparatus constant (sensitivity-factor) can be calculated immediately from the geometric dimensions of the capacitor. The complete theory of this manometer is given. All parameters, which possibly could invalidate the pressure measurements are discussed. The results of measurements show that within the range of accuracy of measurements there is agreement with the theory. *Subject Headings:* **1. Microbarographs 2. Micromanometers.**—*Author's abstract.*

12.1–243 551.508.53/54:551.551

Chepil, W. S. and Siddoway, F. H. (*both, Dept. of Agric.*), **Strain-gage anemometer for analyzing various characteristics of wind turbulence.** *Journal of Meteorology*, Boston, 16(4): 411–418, Aug. **1959.** 10 figs., 2 tables, 11 refs. **DWB, DLC**—This article describes an apparatus composed of a strain-gage assembly, electrical amplifier, and recording oscillograph for measuring characteristics of wind turbulence of velocity-fluctuation frequencies up to 120 cy per sec. All parts but the strain-gage assembly are available commercially. Fluctuations of wind pressure and velocity were recorded along the x, y, and z axes for different wind velocities and various heights above surfaces of certain degrees of roughness in a wind tunnel and in the field, and the recorded data were analyzed to check the adaptability of the apparatus. Analyses indicated the presence of uniformly turbulent flow in the wind tunnel, but records from the field indicated a variably turbulent flow in which the larger scales of turbulence were superimposed on the smaller ones. No matter what type of turbulent flow, analyses indicated that the velocity fluctuations along the x, y, and z axes some distance above the ground were statistically distributed to fit the normal curve. The fit was reasonably good for various drag velocities, axes, and magnitudes of surface roughness. Close to the ground, on the other hand, both pressure and velocity curves for x and y axes did not fit the normal curve but velocity fluctuations along the y axis reasonably fit the normal curve. Records indicated that the relative intensity of turbulence, which is a measure of the velocity fluctuation at some particular height in proportion to the mean velocity at that height, was greatest nearest the surface and decreased in arithmetic proportion with height. The relative magnitude of turbulence, which is a measure of fluctuation of velocity at a particular height in proportion to the drag velocity, on the other hand, was lowest nearest the surface, increased with height depending on roughness of surface, then decreased with height. The scale of turbulence, which denotes the relative size of eddies, was smallest nearest the ground and increased as the logarithm of height. The turbulence factor, which denotes how much greater the maximum impulse forces of turbulent flow are over those of uniform flow of equal mean velocity, was greatest and had a mean value of 2.71 very close to the surface and decreased rapidly with height. It remained virtually constant for different degrees of surface roughness and drag velocities of the wind. *Subject Headings:* **1. Strain-gage anemometers 2. Turbulence measurement instruments.**—*Authors' abstract.*

12.1–244 551.508.54

Shinohara, T., **On the results of experiment for practical use of three-cup anemometer.** *Journal of Meteorological Research*, Tokyo, 10(7):587–590, July **1958.** 3 figs., 5 refs. In Japanese. **DLC**—Experimental studies, with the data of daily and 10 minute duration mean wind velocity of about 10 locations from Jan.–April 1956, show that three-cup anemometer is superior to the four-cup anemometer in the natural wind as well as in the wind tunnel, and also that the present four-cup anemometer gives about 10% greater value than actual value in the wind tunnel. The difference of the value of wind velocity on the top of a tower occasionally exceeds the difference of the values obtained by three-cup and four-cup anemometers. Systematic difference of wind velocity due to directional change appears at high wind velocity. Observed data are graphed. *Subject Heading:* **1. Cup anemometers.**—*J. H. Woo.*

12.1–245 551.508.71:551.571.3

Wood, Rex C. (*General Mills, Inc.*), **The infrared hygrometer as a potential meteorological aid.** *American Meteorological Society, Bulletin,* 40(6):280–284, June **1959.** 6 figs., 6 refs. **DWB, DLC**—The infrared absorption-spectra hygrometer possesses inherent advantages which will be of interest to the meteorologist concerned with difficult humidity measurement problems. Data samples are presented which illustrate typical atmospheric humidity variations as obtained with a relatively uncomplicated experimental instrument featuring a short, 12-in. sensing path. Also included is a discussion outlining method advantages in particular areas: micrometeorology, air weather reconnaissance, Arctic meteorology, and other research applications. *Subject Headings:* **1. Infrared absorption hygrometers 2. Humidity variations.** —*Author's abstract.*

12.1–246 551.508.72

Schendel, U., **'n Grondverdampingstoestel vir die meet van die verdampingskrag van die lug soos gemeet vanaf 'n versadigde grondoppervlakte.** [Soil evaporimeter for measuring the evaporative power of the air from a saturated soil surface.] *South African Journal of Agricultural Science,* Pretoria, 2(3):413–417, Sept. **1959.** 2 figs., plate.—Description of a new evaporimeter which measures the evaporation power of the air from a soil surface of 133 cm^2 which is kept constantly saturated and contained in a cylinder placed in the ground. A schematic drawing of the apparatus and photos of the installation are presented. Comparative measurements with the Piche and Livingston evaporimeters show that the evaporation from the soil evaporimeter > Piche evaporimeter > Livingston black and white evaporimeters. *Subject Headings:* **1. Evaporimeters 2. Evaporimeter comparisons.**—*A. V.*

12.1–247 551.508.74

Cuillé, J.; Guyot, H.; Kitrosser, I. and Lecomte, J., **Le roséographe photographique.** [The dew recording camera.] *Fruits,* Paris, 13(7):293–297, July/Aug. **1958.** 3 photos, 3 refs. **DA**—Description of an apparatus designed for the photographical recording of the dew settling and its duration. The disposal is composed of a 16 mm camera, an electronic flash-lamp and a contact-clock. Its functioning is as follows: the shooting is adjusted on a part of the sheet or on a Duvdevani gage, and every 15 min. the clock establishes a first contact, the effect of which is to put the flash-lamp condenser in charge. Fifteen sec later, a second contact closes the circuit of a solenoid which starts the shooting. The camera is provided with a synchronized contact and closes itself the circuit which switches on the torch of the flash. The authors compare the results provided by this disposal with those obtained by means of the apparatus of the French National Meteorological Office. *Subject Headings:* **1. Dew recorders 2. Drosometer comparisons.**—*A. V.*

12.1–248 551.508.74

Skachkova, I. F. and Shvarts, M. B., **Ob izmerenii rosy.** [Dew measurement.] *Meteorologiia i Gidrologiia,* Leningrad, No. 4:55–58, April **1959.** 3 figs., 4 refs. **DWB, DLC**—The instruments for measuring dew deposition are divided into three types namely: those based on the principle of weight, on volume, and on the change of the physical parameters of the different devices. Examples of several types are described, these include the dew recorder of Kessler of which the principle part is a torsion balance; the Mrose apparatus in which dew is measured by measuring the volume of a liquid which varies as a function of the amount of dew formed. The visual method of Duvdevani is outlined. Also the dew recording method of Ianishevskiĭ which is a weight method, and is used in the Soviet Union, is described and its defects are noted. With the aid of a photograph and a diagram the authors describe the construction of a dew recorder using the balance method and material, having the heat conductivity and radiactional properties close to that of a leaf. The receiver of the automatic recorder was a cone shaped plate of vinyl plastic fastened to one arm of the seam of a balance. Beneath the receiver was set up a cone shape plate for collecting dew on the lower surface thereby eliminating losses of dew from both surfaces of the receiver. A balancing weight is attached to the other end of the beam, which is on a hub and rotates on pins. The hub also carries the measuring weight and an arrow with a pen. The record is made with ink on the ribbon of a drum moved by a clock mechanism. The device is protected from the wind by a screen. The calibration of the automatic recorder is described and a reproduction of the actual record is presented. The results of the use of this device and some of its defects are discussed. *Subject Heading:* **1. Dew recorders.**—*I.L.D.*

12.1–249 551.508.57:681.14

Arnold, Abraham and Lowenthal, Marvin J., **The computation of rawinsonde flights by general purpose automatic computers.** *U. S. Signal Research and Development Laboratory, Fort Monmouth, N. J., Technical Report,* No. 2063, Oct. 15, 1959. 27 p. 5 tables, 8 refs., 35 eqs. **DWB**—The computation required for a rawinsonde flight is presented. Separate equations are given so that each element of meteorological information may be computed from the output data of Rawin Set AN/GMD-1( ). The equations are then programmed for a general purpose automatic computer which computes the temperature, humidity, height, and wind values from the raw data. *Subject Headings:* **1. Rawin data 2. Electronic data processing. I. U. S. Army Signal Research and Development Lab., Fort Monmouth, N. J. II. DA Task 3-99-07-302.**—*Authors' abstract.*

12.1–250 551.508.822

Cehak, K. (*Vienna, Zentralanstalt f. Met. & Geod.*), **Ein statistischer Vergleich der Radiosonden Wien und Budapest.** [Statistical comparison of radiosonde measurements in Vienna and Budapest.] *Időjárás*, Budapest, 63(2):65–74, March/April, 1959. 5 tables, 4 refs. English summary p. 65; Hungarian summary p. 72-74. **DLC**—On the basis of radiosonde measurements carried out in the years 1952–1956 in Vienna and Budapest monthly mean values of pressure, temperature and atmospheric humidity were investigated on the above stations on ground level and at the altitudes of 1, 2, 5, 7, 10 km. As a result of these investigations it can be stated that the small deviations of atmospheric pressure appearing from 500 m upwards are to be attributed in spring, autumn and winter to accidental errors. In summer, however, these deviations go beyond the character of casual errors. The same result is obtained also concerning the temperature data. Investigations on humidity data resulted in finding deviations surpassing accidental errors on all levels in winter, and at altitudes above 1000 m in the other three seasons. The employed instruments are comparable from the point of view of the pressure values. Identical temperature data are to be obtained in spring, autumn and winter. As a final result it can be stated that the radiosonde measurements of Vienna and Budapest are, with the exception of those in summer, comparable and equally well utilizable for the purposes of average height charts. The higher temperature data in summer of the radiosonde measurements in Budapest are to be explained with the radiation errors of the applied instrument; this problem however, could be decided only by a direct comparison of the instruments. *Subject Heading:* **1. Radiosonde comparisons.**—*Author's abstract.*

12.1–251 551.508.822

Kawase, Zirō and Nyui, Kōichi, **On the measurement of swing of radiosonde.** *Tateno, Japan. Aerological Observatory, Journal,* 6(3):113–117, Jan. 1959. 5 figs., 4 photos, table. In Japanese; English summary p. 113. **DWB, DLC**—It can easily be seen that the power of incoming signals which are sent from flying radiosonde (1680 Mc, RSII type) have periodic variations. This phenomenon provides not only an obstacle to the radiosonde receiving but also to the measuring of the distance between the observatory and sonde by means of a transponder system (this is called Echo-sonde in Japan). This obstacle may be caused by the combination of the swing of the flying radiosonde and the directivity characteristic of its antenna. The authors tried to measure experimentally the swing in the upper air and the variation of the detector current of the receiver. To measure the swing, a radiosonde with pendulum system was lifted. The results obtained are as follows. 1) Principal period of the swing is about 6 sec, superposed by many irregular longer periods. 2) Larger amplitude was found above the layer of maximum wind velocity, and rarely in the layer of eastern wind. 3) The radiosonde is apt to incline as much as 20°–30° from plumbline. 4) The results 1) and 2) coincide with the variation of the detector current, and the principal period roughly coincides with the swinging period of the radiosonde which hangs down from a balloon with lines 7 m long. *Subject Heading:* **1. Radiosonde swing.**—*Authors' abstract.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Agromet. forecasting** (Ulanova), 12.1–9; **Hail forecasting** (Alt), 12.1–47; **Microclimat. forecasting** (Platt, Williams), 12.1–66; **Prediction of radioactivity in soil and crops** (Barbier et al.), 12.1–86; **Fallout prediction for tower bursts** (Nagler et al.), 12.1–87; **Fallout predictor** (Richter), 12.1–88; **Gas-load dispatching** (Murray, Trettel), 12.1–95; **River discharge forecasting** (Poklepa), 12.1–206; **Seasonal stream flow forecasts** (Nezhikhovskiĭ), 12.1–207; **Transosonde data utilization** (Mastenbrook), 12.1–235.

12.1–252 551.509.3:551.557.5:551.513.2

§Defant, Friedrich, **Synoptic investigation of the flow and mass field in the close vicinity of the summer subtropical jet stream relative to the jet-axis.** International Institute of Meteorology, Univ. of Stockholm, Contract 61(514)-963, Technical (Scientific) Note, No. 6, (**1960**). 49 p. 21 figs., 8 refs., eqs. **DWB** (M(051) I61tn)—A detailed synoptic explanation of the state of the mass field and of the field of flow, in the close vicinity of the summer subtropical jet stream, (600 km north of and 1000 km south of the current core). Emphasis is laid on the interrelation of subtropical jet, subtropical tropopause break or overlap, and the subtropical front. Long waves of fairly large amplitudes that exist in the summer subtropical jet core are discussed. The record illustrates the principal conditions of the mass and flow field for the front and rear sides of these long subtropical jetstream waves. Computations of the vertical motion of these waves are given, and the principal average character of the vertical circulations which accompanies these subtropical jet waves is included. *Subject Headings:* **1. Subtropical jet stream 2. Synoptic studies of jet stream waves.**—N.N.

12.1–253 551.509.314:551.557:551.524.7

McRae, J. N. and Phillpot, H. R. (*both, Central Met. Office, Melbourne*), **Some statistics relating to 300 and 200 mb winds and temperatures and forecasts of these elements on the Sydney-Nandi air route.** *Australian Meteorological Magazine*, Melbourne, No. 25:1–28, **June 1959.** 2 figs., 14 tables, 7 refs., 2 eqs. **DWB**—Although no actual experience of aircraft operations at 30,000 and 40,000 feet was available on the Sydney-Nandi route, an attempt was made to assess the likely order of accuracy of forecasts of wind and temperature at these heights on the route. As background data, the standard deviation of wind and temperature and statistics relating to the variation of wind in time and space were derived for stations near the route. As these statistics are not available elsewhere they have been included in the article. Using upper air analyses which contain an unknown error, a subjective assessment was made of the errors in 24-hr forecasts of wind and temperature. By the use of statistical relations errors in 24-hr point forecasts were used as a check on the errors in 24-hr equivalent head winds over the route. Statistical relations were also used to assess, from 24-hr EHW forecasts, likely errors in shorter period forecasts. An assessment was also made of the probable error in forecasting by statistical methods. All methods indicated a RMS error in wind forecasts of about 15 kt for forecasts made 8 to 20 hr after the time of observations. Using the assessed errors in 24-hr forecasts of temperature over four zones of the route and 24-hr temperature forecasts for points near the route, RMS errors in temperature forecasts for periods of 8 to 32 hr were assessed to range from 2.5°C in the western zone to 2°C in the eastern zone. *Subject Headings:* **1. Statistical forecasting 2. Upper air wind forecasting 3. Upper air temperature forecasting 4. Sydney-Nandi air route.**—*Authors' abstract.*

12.1–254 551.509.318:551.515(569.4)

Aelion, E. (*Israel Meteorological Service*), **A report on weather types causing marked storms in Israel during the cold season.** *Israel. Meteorological Service, Series C, Miscellaneous Papers*, No. 10, **1958.** 7 p. 9 figs., table, 6 refs. **DWB**—This is an analytical study of weather types affecting Israel during her cold season from Nov. through April. The classification is based on Hess and Brazowsky's catalogue and includes occurrence of the individual weather types which are also mapped separately. The analysis of 37 storms during Nov. through April 1947–1952 included the following stations for rainfall amounts exceeding 30% mean monthly values being:

	Jan.	April
Jerusalem	150 mm	37 mm
Rehovot	145 mm	18 mm
Beersheba	52 mm	13 mm

Largest amount of rain vs. upper through passing Israel was 60% of the cases, 10% with the approach and 30% were associated with the passage of surface cold fronts. Further data comprise effect of air circulation on spreading of rain to Beersheba, cyclogenesis in the Sudan over which seven closed shallow lows formed, development of surface and upper level systems in eastern Mediterranean, position of the Azores high and the Siberian high and, finally, the relationship between the circulation index and days with maximum rain. *Subject Headings:* **1. Weather types 2. Storm analysis 3. Israel.**—*W.N.*

12.1–255 551.509.**318**:551.**589.1**(234.3)

Schüepp, Max (*Zurich*), **Die Klassifikation der Witterungslagen.** [Classification of weather situations.] *Geofisica Pura e Applicata*, Milan, 44:242–248, Sept./Dec. **1959.** fig., table, 13 refs. German and English summaries p. 242. **DLC**—The author proposes a scheme classifying weather types in areas of the sizes of the Alpine region (of Europe). This scheme is based on the classification principles published by LAUSCHER in FLOHN's book on **Witterung and Klima in Mitteleuropa** (*see* 5.9–3, *Met. Abstracts*). The number of classes is raised from 5 to 6, the number of weather types from 17 to 33. The amplified scheme applies to any region and permits a perspicuous arrangement of weather types. Weather types are coded by two numbers indicating the general character and the prevailing wind direction. *Subject Headings:* **1. Weather type classification 2. Synoptic climatology 3. Alps.**—*Author's summary.*

12.1–256 551.509.**323**:551.**524.36**

Reuter, Heinz (*Zentralanstalt für Met. u. Geophysik, Vienna*), **Zur Praxis der Prognose der nächtlichen Abkühlung.** [The practice of forecasting nocturnal cooling.] *Zeitschrift für Meteorologie*, Berlin, 12(4/6): 132–135, April/June **1958.** fig., table, 7 refs., 6 eqs. **DWB, DLC**—The author derives a formula for computing the amount of nocturnal cooling at the surface, namely:

$$\Delta T_0 \equiv T_a - T_0 = \frac{2}{\sqrt{\pi}} \frac{\lambda\beta + c_p A(\gamma - \gamma_1) + E - V}{\sqrt{\lambda_g c + c_p \sqrt{A_{g_L}}}} \sqrt{t}$$

(T_0 = temperature of the earth's surface; c_p = specific heat of air at constant pressure; A = exchange coefficient of the atmosphere; λ = heat conductivity of the ground; V = heat loss (gain) by evaporation (condensation); E = long wave radiation balance). The time $t=0$ coincides practically with sunset. For computing the minimum temperature the actual length of night is inserted. The first two terms in the numerator on the right side can be considered corrections for E. The determination of A is achieved by means of a semi-empirical relationship between atmospheric exchange and horizontal wind velocity, namely $f(v) = \Delta T_0/E^*\sqrt{t}$ (E^* = corrected long curve radiation balance). A particular case of determination of the function $f(v)$ is presented and the equation $v = a + b \log f$ is obtained where $a = 45.55$ and $b = 31.89$ when v is in km/hr and the unit $f(v)$ is selected so that E^* is in cal/cm^2 min and t in hours. The correlation coefficient is $r = 0.92$ and the mean square deviation for v is 1.7 km/hr. With the aid of the formula for v and that for ΔT_0 the forecast of the minimum night temperature was tested for the months of April, May, September and October 1957 and the forecast and actual night minimum temperature are presented in a table. *Subject Headings:* **1. Nocturnal minimum temperature forecasting 2. Nocturnal cooling.**—*I.L.D.*

12.1–257 551.509.**324.2**:551.509.**318**:551.**558.2**:551.**577.21**

Izawa, T., **On the quantitative prediction of precipitation.** *Journal of Meteorological Research*, Tokyo, 12(1):1–8, Jan. **1960.** 8 figs., table, 3 refs., 46 eqs. In Japanese; English summary p. 1. **DWB**—A quantitative method of predicting precipitation due to large scale vertical motion is described. First, the numerical prediction scheme of prediction expressed by $m = \mathfrak{F}\omega$ (where ω is the vertical p-velocity and $\mathfrak{F}$ the ratio of condensation) is discussed in detail. It is seen in paragraph 3 that a solution of ω governing the equation

$$\frac{\partial^2\omega}{\partial p^2}+\alpha^2\nabla^2\omega=F(x,y,p)$$

subject to the boundary conditions $\omega_{p=0}=0$, $\omega_{p=p0}=\omega_0$ is given by

$$\omega=\frac{1}{\alpha\nabla}\int_0^p \sin\{\alpha(p-p')\nabla\}\, Fdp'-\frac{\sin(\alpha p\nabla)}{\sin(\alpha p_0\nabla)}\left[\frac{1}{2}\int_0^{p_0}\sin\{\alpha(p-p')\nabla\}\, Fdp'-\omega_0\right]$$

where α is a constant, ∇^2 the Laplacian operator and F the function of x, y, p, which may be approximated in a finite term of Taylor's expansion. Next, the simplified expression of the 12 hr prediction of precipitation is given by some simplification and modification of the above solution. Finally, an example for the 12 hr prediction of precipitation in the case of heavy rain experienced in the southern part of Hokkaidō, 12 to 13 Sept. 1957, is shown in a good agreement. *Subject Headings:* **1. Quantitative rainfall forecasting 2. Large scale vertical motions.**—*Author's abstract.*

12.1–258 **551.509.326**:551.**578.7**(451.1)

Barla, Mario, **Statistica ed analisi diagnostica dei temporali sul Piemonte centrale.** [Statistics and diagnostic analysis of thunderstorms in the Central Piedmont.] *Simposio Internazionale sulla Fisica delle Nubi e Relative Applicazioni all'Agricoltura, Asti, Italy, April* 1958, *Atti*, pub. Dec. **1958.** p. 76-83. 4 figs. Italian, French, English summaries p. 85.—On the basis of a series of tridimensional meteorological observations regarding the Central Piedmont, deductions have been made to establish some rules for the forecasting of storm phenomena with a special regard to hail. *Subject Headings:* **1. Thunderstorms 2. Hail 3. Forecasting methods 4. Central Piedmont, Italy.**—*Author's abstract.*

12.1–259 551.509.33:551.509.338

Sutton, Sir Oliver Graham (*Met. Office, London*), **Looking ahead in weather forecasting.** *Geographical Magazine*, London, 33(5):287–294, Sept. **1960.** 3 figs., photos. **DLC**—Long-range forecasting in Great Britain is only carried out on an experimental basis. It will never be possible to give a precise day to day forecast over long periods. The best that can be hoped for is a generalization on the type of weather. There are singularities in British weather, i.e., calendar periods when the weather is more probably cyclonic than anticyclonic, or vice versa. The existence of cycles in weather has not been decisively disproved but it is unlikely that these will ever be used for forecasting. Correlation with sunspot cycles is also likely to prove unrewarding. There is no single variable the study of which would permit forecasts of deviations from the climatic average to be made. The development of electronic computers enables the forecaster to handle more data and the satellites will permit of a more complete study of the radiation balance and the general circulation. The possibility of reliable forecasts in future is more an article of faith among meteorologists than a reasoned belief. *Subject Headings:* **1. Long range forecasting 2. Weather singularities.**—*R.B.*

12.1–260 551.509.**34**:551.**582.2**:551.**501.9**:656.71(477)

Bershchanskiĭ, Iu. I., **Nauchno-issledovatel'skaia rabota na AMSG L'vov.** [Scientific research work at the Lvov air weather station of the Civil Air Fleet.] *Meteorologiia i Gidrologiia*, Leningrad, No. 7:38–40, July **1959. DWB, DLC**—Extensive studies of the aerological, meteorological and synoptical conditions at the Lvov airport are described in details in view of its special geographic position close to the Carpathian Mts. Preliminary plan of studies was discussed with local hydrometeorological organizations. The aerodynamic conditions around Lvov were analyzed with previous records particularly in directions of basic airways. The appearance of fogs and low clouds was coordinated with humidity, temperature, velocity and direction of winds. The attention is also given to the thunderstorms and meteorological conditions, preceding the storm; to formation of ice on the aeroplanes, to the rain and wind storms. The results of the studies were classified and tabulated for use in local forecasting. *Subject Headings:* **1. Airport climatology 2. Climate of Lvov 3. Local forecast studies 4. Lvov, Ukrainian S.S.R.**—*N.P.S.*

12.1–261 551.509.5:656.71(02)

§*Anderson, Russell L., **Terminal forecast manual, Nellis AFB Nevada.** Detachment 31, 25th Weather Squadron, Nellis AFB, Las Vegas, Nevada, Feb. 28, 1959. 24 p. tables, 9 figs. Photostat of typescript. **DWB** (M09.A549te)--The material compiled for this manual consists of objective studies on the most critical weather conditions relative to the operation of the station. The remainder consists mainly of situations observed, pertinent to general and specific types and a compilation of empirical rules by forecasters of the detachment. The arrangement of the material is roughly in three parts. First, Nellis AFB with Base Weather and Nellis Area with additional forecasting sites is shown in charts I and II and geography, topography and oceanography of the area is discussed. Later topographical effects on local weather and regional and climatic conditions are studied. Finally, predominant weather situations, surface and upper air, are considered and graphically presented. With thunderstorms, wind and blowing dust the three worst hazards to flying, it is felt that the objective studies already completed should be supplemented by further objective work in order to broaden the scope of the forecasting tools and capabilities. *Subject Headings:* **1. Airport forecasting manuals 2. Nellis AFB, Las Vegas, Nev.**—*I.S.*

WEATHER CONTROL

See also: **Frost protection by sprinkling** (Weise), 12.1–53.

12.1–262 551.509.6(73)

Weather modification in the United States. *Nature*, London, 183(4672):1371–1372, May 16, 1959. **DWB**—The National Science Foundation will distribute $1,130,000 as follows for scientific studies of various aspects of weather control: $114,300 to Univ. of Chicago, Dept. of Met. (H. B. Byers and R. Braham) for research on physical effects of silver iodide seeding over the Great Plains; $161,800 to Univ. of Arizona Inst. of Atmos. Phys. (A. R. Kassander, L. J. Battan and J. E. McDonald) for research on cloud physics and cloud modification; $90,500 to Aerometric Research Inc., Goleta, Calif. (R. D. Elliott) for research on precipitation process and efficiency of Pacific coast storms; $68,900 to U. S. Weather Bureau (D. B. Kline) for synoptic observations and studies of freezing nuclei anomalies; $57,100 to the Atmospheric Research Group of Pasadena, Calif. for field studies in cloud physics related to nucleation, hydrometer development, electrification and cloud dynamics; $50,000 to U. S. Office of Naval Research (B. Vonnegut) for cloud electrification studies (by A. D. Little, Inc.); $40,000 to Met. Research Inc. (P. MacCready) for 2-year cloud physics (radar) studies at Santa Barbara; $383,700 to Univ. of Chicago, Dept. of Met. (H. B. Byers) for 3-year research into cloud physics and precipitation mechanisms: particles, nuclei, ice crystals, waterdrops; $64,900 to Univ. of Calif., Statistical lab. (J. Neyman) for a 2-year study on randomized cloud seeding at Santa Barbara and Ventura counties; $58,800 to N. Y. U., Dept. of Math. (M. A. Woodbury) for a 2-year study of statistical evaluation of weather modification; $25,000 to A.G.U. for a **Conference on Mechanism of Precipitation Formation**; $10,000 for a **Conference on Design and Conduct of Research Programmes in Weather Modification** by the National Academy of Sciences—National Research Council (S. S. Wilks); $5,100 for a **Conference on Instrumentation for Cloud and Weather Modification** by the Foundation for Instrumentation Education and Research. *Subject Headings:* **1. Weather control research 2. United States.**—*W.N.*

12.1–263 551.509.616:551.576.1:778.38

Jefferson, G. J., **Man-made cumulus.** *Meteorological Magazine*, London, 89(1050):16–17, Jan. 1960. 5 photos. **DWB, DLC**—The occurrence of cumulus and cumulonimbus over the Goldenburg Power Station at Knapsack, Cologne, Germany, is described. A photograph taken in May 1957 of a cumulus cloud is shown. Three cumulus towers in various stages of growth are visible in the photograph. The synoptic situation on the same day is also described. The height of the cumulus tops obtained by the use of simple photogrammetric methods is reported. The clouds in the photograph, reportedly, did not give showers while still within visual range. *Subject Headings:* **1. Cumulonimbus clouds 2. Artificial clouds 3. Cloud photogrammetry.**—*I.S.*

12.1–264 551.509.617:551.574.2:546.57:546.15

Carreras-Patxot, Rafel and Sänger, Raymund (*both, Swiss Federal Inst. of Technology, Dept. of Physics, Zurich*), **A method for studying the diffusion of silver iodide particles in the atmosphere by means of I^{131}.** *Zeitschrift für Angewandte Mathematik und Physik*, Basel, 9a(4):375–380, 1958. 5 figs., 3 refs. Note: Paper presented at the 3rd International Symposium on Atmospheric Condensation Nuclei, Cambridge, England, July 16-18, 1958. **DLC**—The silver iodide as used in cloud seeding was experimentally marked with radioactive 10^{-17} curie iodine 131 in order to ascertain what happens to the vapor after it leaves the generator. A refined chemical method described in detail enabled detection of silver iodide at several hundred meters distance from the generator. This sensitive method is quite different from the conventional freezing chamber method. However, neither method has solved the problem. *Subject Headings:* **1. Silver iodide diffusion 2. Radioactive nuclei.**—*W.N.*

12.1–265 551.509.617:551.574.2

Fournier d'Albe, E. M. (*UNESCO Mission, Inst. Ciencia Aplicada, Mexico, D.F., Mexico*), **Artificial cloud nucleation with sodium chloride.** *American Geophysical Union, Geophysical Monograph*, No. 3:106–110, 1959. 2 figs., 2 tables, 10 refs. **DWB, DLC**—First the paper discusses the mechanism of rain formation in the light of various theoretical investigations. The role of giant hygroscopic nuclei in rain formation and its geographical distribution are considered. Using Squire's method the results of calculations of growth of droplets are tabulated. A summary of recent observations given in a paper by EAST, showing liquid mixing ratio and temperature at the initial radar echo, is also tabulated. Concentration and size distribution of natural hygroscopic nuclei is graphically represented. The paper then describes the various techniques of seeding with artificial hygroscopic particles. Size distribution of milled salt used in seeding from the ground is shown in the diagram. Finally, the problem of evaluation of these techniques is considered and the possibility of using a physicochemical method as an aid in the evaluation of experiments in which salt is the seeding agent, is examined. *Subject Headings:* **1. Cloud seeding with salt 2. Hygroscopic nuclei.**—*I.S.*

12.1–266 551.509.617(52)

Hatakeyama, H. (*Met. Res. Inst.*), **Artificial rain-making in Kanto District.** *Papers in Meteorology and Geophysics*, Tokyo, 7(3):333–335, Oct. 1956. 5 refs. **DWB**—This paper reports a series of basic researches concerning the artificial modification of clouds in Kanto District. These researches were carried out by members of the Division of Meteorology sponsored by Tokyo Electric Power Co. Five types of experimental techniques carried out at different places during 1955–1956 are discussed. The paper also reports the progress to date of Tokyo Electric Power Co. experiments on practical and long-term AgI smoke generation, aiming at the increase of the precipitation amount at the hydroelectric resources areas. *Subject Headings:* **1. Artificial cloud modification 2. Cloud seeding studies 3. Kanto District, Japan.** —*I.S.*

12.1–267 551.509.617 551.515.21(729.1)

Howell, Wallace E., Associates, Inc., Cambridge, Mass., **Evaluation of cloud seeding for the cane areas of centrales Francisco and Elia Province of Camaguey, Cuba, September 1958–May 1959.** 9 p., 2 figs., table. **DWB** (M09.67 H859ev)—A report on the rainfall stimulation activities in the Province of Camaguey, Cuba, is given. The study includes tabulated details of the evaluation of the activities of Hurricane "Helen" during 1958 in the areas of Elia and Francisco and the possibility of changing the evaluation techniques now in use. *Subject Headings:* **1. Cloud seeding evaluation 2. Hurricane "Helen" (1958) 3. Camaguey Province, Cuba.**—*N.N.*

12.1–268 551.509.617:551.574.11(52)

Nemoto, S.; Takahashi, Y.; Soma, K. and Kudo, T. (*all, Met. Res. Institute, Tokyo*), **On the observation of the number of ice crystal nuclei in the air near the ground at Tokyo, and the effect of the cloud seeding with silver iodide at the top of Mt. Fuji.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 35(2):137–140, April 1957. 15 figs., table, 3 refs.

In Japanese; English summary p. 137-138. **DWB, DLC**—In order to detect the increase in the number of ice crystal nuclei in the air near the ground at Tokyo due to cloud seeding and to obtain a basis for determining whether or not cloud seeding might be effective for rainfall, the authors studied a period from Feb. to March 1956. Observations were made for two 5-min periods at each observation time of 11 a.m., 2 p.m. and 4:30 p.m. every day with some flexibility. The "continuously sucking" method was adopted instead of "small sampling." With the exception of seeded days, the number of ice nuclei at Tokyo are as follows: 1. Their number increased with wind velocity (Fig. 7); 2. Their maximum and mean values were 0.8 and 0.25, respectively per litre of air (Fig. 10); 3. Their number did not depend on wind direction and weather conditions (Figs. 8 and 9). The effect of the cloud seeding with silver iodide at the top of Mt. Fuji through 4 seeding experiments made on March 2, 3, 9, and 10 is shown in Fig. 1. No increase could be found because of the deviation of the path of smoke from the Tokyo area 2. Their maximum values amounted to about 3 or 4 times as large as that of unseeded usual days. *Subject Headings:* **1. Cloud seeding with silver iodide 2. Ice crystal nuclei 3. Tokyo, Japan.**—*K.C.*

12.1–269 551.509.617

Raghavan, K. (*Met. Office, Poona*), **The suitability of the Cape Comorin area for testing cloud seeding techniques.** *Indian Journal of Meteorology and Geophysics*, Delhi, 10(3):291–294, July **1959.** 4 figs., 3 tables, 3 refs. **DWB, DLC**—The areal distribution of rainfall in the southwest corner of the Peninsula is studied for the month of July. Suitability of control and target stations for testing seeding techniques in the area of Cape Comorin is discussed and essential conditions for the test are stipulated. *Subject Headings:* **1. Rainfall distribution 2. Cloud seeding evaluation 3. Cape Comorin, India.**—*Author's abstract.*

12.1–270 551.574.1 551.509.617:546.57:546.15

Schaefer, Vincent J. (*Schenectady, N. Y.*) and Dieterich, John H. (*Missoula, Mont.*), **The seeding of cumulus clouds by ground-based silver iodide generators.** *Zeitschrift für Angewandte Mathematik und Physik*, Basel, 10(2):174-188, **1959.** 8 figs., 11 refs. **DLC**—Cloud seeding operations during the 1957 season of Project Skyfire in western Montana are described in detail. The experiments were conducted under closely controlled conditions, and visible results were recorded photographically (sample photographs are presented). The experiments are found to show conclusively "that it is quite feasible to introduce enough silver iodide into cumulus clouds by suitably located AgI ground based generators to produce unnatural effects wherever the clouds were colder than −40°C. The complete change from subcooled cloud droplets to masses of ice crystals occurs rapidly and produces spectacular changes." *Subject Headings:* **1. Cloud seeding with silver iodide 2. Project Skyfire 3. Silver iodide smoke generators 4. Western Montana.**—*G.T.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

ATMOSPHERIC COMPOSITION

12.1–271 551.510:519.24

†Shorr, Bernard (*ed.*), **Multivariate statistical analysis of atmospheric processes.** Travelers Weather Research Center, Hartford, Conn. Contract AF 19(604)-3877, Final Report, Aug. 1, **1959.** 89 p. figs., tables, 26 refs., eqs. **DWB** (M(051) T779re)—The report is divided into three sections. Section one deals with discriminant function analysis, a method for classifying sets of observed weather elements into groups. A screening type procedure is recommended to select the important classificatory variables. Section two describes Canonical correlation which gives a measure of strength to the relationships between two entire sets of variables. This may be viewed as a generalization of multiple correlation. In the last section the design of a large scale experiment to examine the problem is discussed. On the whole the concept of a co-ordinate system moving with the storm center is stressed. It also outlines data gathering procedures for 352 cases and presents plans for the data analysis. *Subject Heading:* **1. Statistical analysis of atmospheric processes.**—*I.S.*

12.1–272 551.510.41:546.264 551.464:546.264

Bolin, Bert and Erikssen, Erik (*both, Intnatl. Met. Inst., Stockholm*), **Changes in the carbon dioxide content of the atmosphere and sea due to fossil fuel combustion.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 130–142. 5 figs., 14 refs., 48 eqs.) **DLC**—The dissociation equilibrium of carbon dioxide in the sea is discussed with particular emphasis on the buffering effect of sea water, when changes of the par-pressure of CO_2 in the gas phase take place. The results are used in a study of the changes of the carbon dioxide content of the atmosphere and the sea that occur as a result of release of CO_2 to the atmosphere by fossil fuel combustion. It is shown that the steady state considerations given by previous authors hereby are considerably modified. Thus an increase of the CO_2 content of the atmosphere of about 10% as reported by CALLENDAR may be compatible with a Süess effect of only a few percent. Because of the small buffering effect of the sea it seems likely that the biosphere on land may play a more important role for the changes actually occurring in the atmosphere due to release of CO_2 by combustion than previously believed. This problem warrants further investigation, but already the present treatment indicates that an appreciable increase of the amount of CO_2 in the atmosphere may have occurred since last century. This increase will continue and should be detectable with present techniques for measuring CO_2 in the atmosphere within a few years in areas with little or no local pollution due to fossil fuel combustion as in the Antarctica or on Hawaii. *Subject Headings:* **1. Carbon dioxide in oceans 2. Carbon dioxide variations.**—*Authors' abstract.*

12.1–273 551.510.41:551.584.5:546.265

Gil'denskio'ld, R. S., **O predel'no dopustimom soderzhanii serougleroda v atmosfernom vozdukhe naselennykh mest.** [Maximum permissible concentration of carbon disulfide in the atmospheric air of residential districts.] *Gigiena i Sanitariia*, Moscow, 24(6):3–8, June **1959.** 2 figs., 2 tables, 8 refs. English summary p. 7. **DWB, DLC**—The field experience with the previously accepted maximum permissible concentrations of carbon bisulphide in the atmospheric air (the maximum concentration at one time—0.5 mg/m^3; the daily average concentration—0.15 mg/m^3) has shown that these values were too excessive. These standards have been checked experimentally and new maximum permissible concentrations of carbon bisulphide have been established on hygienic bases. The threshold value of smell sensation for carbon bisulphide in the most sensitive persons comprise 0.05 mg/m^3. The reflex action by the method of optic chronaxy and adaptation to darkness, has been obtained with threshold values of investigations the authors recommend to accept 0.03 mg/m^3 as the maximum permissible concentration of carbon bisulphide in the atmospheric air. The examination of the atmospheric air in the vicinity of an artificial viscose fiber plant, devoid of any air purifying installations, has shown the air to be heavily polluted with carbon bisulphide within the radius of 1000 m (0.04 mg/m^3) with the spreading of gas to a distance of 3000 m (0.03 mg/m^3). *Subject Headings:* **1. Carbon disulfide in atmosphere 2. Maximum permissible pollutant dosage.**—*Author's abstract.*

12.1–274 551.510.41/42:629.113:621.43.06

Heim de Balzac, Henri and Serruys, Max, **Automobilisme et salubrité: problème de la pollution de l'atmosphère.** [Motoring and sanitation: problem of atmospheric pollution.] *Revue de Pathologie Générale*, Paris, 59 (No. 713):1363–1368, Dec. **1959.**—The noxiousness of exhaust gases from internal combustion engines or Diesel engines is proportional to their content in noxious compounds which are principally carbon monoxide, hydrocarbides, lead derivatives, and sulphurous acid. The volumetric contents in carbon monoxide varies from 0.1% to 10% according to the running conditions, those in hydrocarbides range about 0.6%. The eduction of lead derivatives and sulphurous acid by motor cars in the atmosphere is slight. The quantities of carbon monoxide and hydrocarbides exhausted in the atmosphere by motors are primarily due to the excess of combustible used for their feeding, and with the conditions of their functioning and tuning. It is possible to prevent the atmospheric pollution from burnt gases by making suitable recommendations to drivers of engines or motor cars. Results of experiments prove that atmospheric pollution can be diminished by adequate devices and eventually by using appropriate combustibles. *Subject Headings:* **1. Atmospheric pollution 2. Automobile exhaust pollution 3. Exhaust gases.**—*A.V.*

12.1–275 551.**510.41**:546.291:546.293

Nicolet, Marcel (*Service du Rayonnement de l'Institut Royal Météorologique de Belgique*), **Sur l'origine des gaz rares dans l'atmosphère.** [Origin of rare gases in the atmosphere.] (In: Angola. Servico Meteorologico, **Miscelanea Geofisica.** Luanda, **1956.** p. 223–228.) **DWB** (M(08) A592 mi)—Mechanisms of the formation and escape of atmospheric argon and helium are discussed. It is found that argon must have been formed at the beginning of the earth's history. It is too heavy to escape and its atmospheric concentration remains constant. Helium, on the other hand, escapes and is being replaced by terrestrial radioactivity and by cosmic radiation at a considerable rate. Thermopause temperatures (in relation to solar energy flux) and atmospheric diffusion and exchange processes involved in the balance of He^3 and He^4 are considered. *Subject Headings:* **1. Gaseous composition of the atmosphere 2. Argon 3. Helium atmosphere 4. Origin of atmospheric gases.**—*G.T.*

12,1–276 551.**510.41**:546.214

Vassy, Arlette and Rouhani, Ali, **Concentration de l'ozone au niveau du sol à la Terre Adélie.** [Ozone concentration at ground level in Adélie Land.] *Académie des Sciences, Paris, Comptes Rendus,* 250(2):380–382, Jan. 11, **1960.** fig., 2 refs. **DWB, DLC**—Results of measurements made for one year during the IGY of the ozone concentration at ground level at the French Antarctic Station Dumont d'Urville. The measurements were made by means of a recording chemical ozonometer. The recordings obtained made it possible to draw the curve of the yearly change in ozone quantity. This curve shows a very important spring maximum, which begins fairly abruptly about Aug. 15 and lasts until December when it ceases also fairly abruptly. Two secondary maximums also appear on the curve; the former, fairly important, begins during the first fortnight of March; the latter, weaker but longer, in June i.e. at the winter solstice in the height of the annual minimum. *Subject Headings:* **1. Ozone concentration 2. Ozone variation at ground level 3. Dumont d'Urville, Antarctica.**—*A.V.*

ATMOSPHERIC POLLUTION

See also: **Health effects from repeated exposure** (Breslow), 12.1–71; **Seasonal variations of metabolism** (Fouchet), 12.1–72; **Atmos. pollution surveys** (McCormick), 12.1–221; **Automobile exhaust pollution** (Heim de Balzac, Serruys), 12.1–274; **Diffusion of heavy particles** (Iudin), 12.1–338; **Vertical wind velocity effects on pollution diffusion** (Panofsky, McCormick), 12.1–345; **Transport of radioactive debris** (Drogaĭtsev), 12.1–354.

12.1–277 551.**510.42**:551.**584.5**:612.1

Dubrovskaia, F. I., **Zagriaznenie vozdukha ulits gorodov avtotransportom pri primenenii etilirovannogo benzina.** [Pollution of the air in urban streets by vehicles operating on ethylated gasoline.] *Gigiena i Sanitariia,* Moscow, 25(4):15–18, April **1960.** 2 figs., 2 tables, refs. English summary p. 18. **DLC**—As the result of investigation, the air in the streets has been found to be heavily polluted with lead. The average 24 hr concentration of lead in the air was 15 γ/m^3 in Chelyabinsk and 6.9 γ/m^3 in Tula, these figures noticeably exceeding the maximal permissible concentration of lead in the air. With the use of nonethylated gasoline in Perm (1958) no traces of lead could be detected in the air of this city. Medical examinations of traffic controllers have demonstrated some changes in their nervous and cardiovascular systems and in the gastro-intestinal tract. Blood analyses have revealed the presence of reticulocytes and erythrocytes with basophylic granules. *Subject Headings:* **1. Atmospheric pollution 2. Automobile exhaust pollution.**—*Author's abstract.*

12.1–278 551.**510.42**

Guruswamy, S. and Narasimhachar, V. S., **Geometric mean particle size and its application in the sampling of air-borne dust.** *Journal of Scientific and Industrial Research, Sec. B,* New

Delhi, 18(8):319–323, Aug. **1959.** 3 figs., 5 tables, 8 eqs. **DWB, DLC**—In order to compare sets of experimental data on the distribution of different sizes of particles in studies on the sampling of air-borne dust, it is necessary to choose suitable parameters of particle sizes. It has been shown that the geometric mean size is a suitable parameter for such studies. The method of calculating the geometric mean size from the experimental data is given, and the application of geometric mean particle size in dust sampling work has been illustrated. *Subject Headings:* **1. Air-borne dust sampling 2. Air sampling and analysis.**—*Authors' abstract.*

12.1–279 **551.510.42:541.451**

Neiburger, Morris (*Dept. Met., Univ. Calif., Los Angeles*), **Meteorological aspects of oxidation type air pollution.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 158–169. 13 figs., 4 tables, 14 refs.) **DLC**—The replacement of coal by petroleum products as an energy source, instead of eliminating ir pollution, has led to a new type of air pollution characterized by the presence of oxidizing substances, chiefly ozone, and the occurrence of eye irritation, damage to vegetation, and eduction to visibility. It has been shown that photochemical reactions involving hydroarbons and nitrogen dioxide in concentrations of a few parts per million can produce all these manifestations. The photochemical reactions require the combination of (1) sources of the eagents, (2) conditions which prevent their dispersal, and (3) adequate solar radiation. The tremendous concentrations of automobile traffic, the exhaust from which is estimated to ontain seven per cent of the hydrocarbons put into the fuel tank, in all metropolitan centers n the U. S. constitute sources which are at least as large as industrial sources (refineries). However, only on the sub-tropical west coasts of continents do the meteorological conditions or accumulation of pollutants, namely persistent light winds and temperature inversions, ccur consistently together with adequate solar radiation. The outstanding example of this ombination is Los Angeles, California. Studies of the relationship of air trajectories to the smog manifestations in Los Angeles are presented. These studies demonstrate the contribuion of automobile exhaust as a principal source. *Subject Headings:* **1. Atmospheric pollution studies 2. Oxidant concentration in air.**—*Author's abstract.*

12.1–280 **551.510.42:551.510.62** 551.594 **551.511.33:551.510.42**

†Neuberger, H.; Panofsky, H. and Sekera, Z., **Physics of the atmosphere.** (In: Magill, Paul L. et al. (*eds.*), **Air pollution handbook.** N. Y. McGraw-Hill, **1956.** Section 4 (61 p.). 21 figs., 5 tables, 63 refs., 150 eqs.) **DWB** (M10.42 M194), **DLC** (TD883.M35)—The discusion in this section is divided into four parts. The first, atmospheric optics, studies the laws governing the propagation of electromagnetic waves through the atmosphere and their changes, with emphasis on the role of scattering particles of different sizes and different optical properties in this process. The next, atmospheric electricity, considers mainly the atmospheric lectric phenomena occurring in the lower atmosphere, the scene of air pollution. In the third art, the fundamentals of thermodynamics, essential for the understanding of the thermal spects of the atmosphere in air pollution problems, are discussed. The final part discusses he motion of the atmosphere and its effect on air pollution. Numerous graphs illustrate the ext. *Subject Headings:* **1. Atmospheric pollution 2. Atmospheric optics 3. Atmospheric lectricity 4. Thermodynamics.**—*I.S.*

12.1–281 **551.510.42:523.16**

Parkin, D. W. and Hunter, W. (*both, Dept. of Physics and Math., Liverpool College of echnology*), **Cosmic dust in the atmosphere.** *Nature*, London, 183(4663):732–734, March 14, **959.** 2 figs., 5 refs. **DWB**—Various techniques of collecting and testing fragmentary etallic particles existing in the atmosphere at different levels are discussed here. From the cid tests it has been shown that the same particle may contain copper and nickel. There are any clues suggesting the extraterrestrial origin of these micro-particles. Further studies and tratospheric sampling may throw new light on the possible initiation of rainfall by meteor howers as advanced by Bowen. *Subject Heading:* **1. Cosmic dust 2. Air sampling and nalysis.**—*W.N.* Ⓢ

12.1–282 551.510.42

Rich, T. A. (*General Elec. Co., Schenectady, N. Y.*); Pollak, L. W. and Metnieks, A. L. (*both, Dublin Inst. for Advanced Studies, Ireland*), **Estimation of average size of submicron particles from the number of all and uncharged particles.** *Geofisica Pura e Applicata*, Milan, 44:233–241, Sept./Dec. **1959.** 5 tables, 3 refs. German and English summaries p. 233. **DLC**—Recently one of the authors introduced for a polydisperse aerosol the useful concept of the equivalent radius which is computed from a monodisperse substitute aerosol with the same fraction of charged nuclei as the actual. In this paper the results of a theoretical and experimental investigation into the agreement between equivalent and average radius of polydisperse aerosols are presented. It is shown that for normal conditions as is to be expected in practice the equivalent radius represents a very good estimate of the average size of submicron particles in polydisperse aerosols. *Subject Headings:* **1. Aerosol size distribution 2. Polydisperse aerosols.**—*Authors' summary.*

12.1–283 551.510.42:551.591

†Steffens, Carsten, **Visibility and air pollution.** (In: Magill, Paul L. et al. (*eds.*), **Air pollution handbook.** N. Y. McGraw-Hill, **1956.** Section 6 (43 p.). 33 figs., 9 tables, 54 refs., 34 eqs.) **DWB** (M10.42 M194), **DLC** (TD883.M35)—This section discusses the various optical effects which air pollutants may cause by affecting the passage of light. The subject is mathematically approached, employing equations and statistical techniques. Numerous tables and graphs accompany the text. The discussion highlights the following: 1) the transmission of light through a turbid atmosphere; 2) some physiological problems associated with observations of visual range, 3) the interaction of light with suspended particles; 4) methods of observation and measurement of the attenuation coefficient and the visual range; 5) the observation and effect of a single source of smoke; and 6) some examples of the relation between pollution and the other quantities are mentioned. *Subject Headings:* **1. Visibility 2. Atmospheric pollution effects on visibility.**—*I.S.*

TROPOSPHERE—TROPOPAUSE—THERMOSPHERE

See also: **Tropospheric radio wave propagation,** 12.1–98 through 12.1–104; **Solar corpuscular influences on upper atmos.** (Rakipova), 12.1–317; **Tropopause profiles** (Chen), 12.1–339; **Stratospheric jet stream** (Pogosian), 12.1–359; **Tropopause height** (Solomon), 12.1–381.

12.1–284 551.510.52:551.524.73:551.547.3

*†Wollschläger, Hannelore, **Extreme Druck- und Temperaturabweichungen in der troposphäre.** [Extreme pressure and temperature deviations in the troposphere.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, Vol. 8, No. 1, **1959.** 36 p. 4 figs., 27 refs., foot-refs., 62 topographic charts. German summary p. 1/29. Thesis (Ph. D.)-Berlin Freie Univ. Vita, last page. **DWB**—The author investigated the extreme pressure and temperature conditions and the deviations from the long period mean in the lower troposphere, for example in the 500 mb level, that can appear in the northern hemisphere, by examining radiosonde data covering a ten-year period and by analyzing absolute 500 mb and relative 500/1000 mb topography maps. The lowest topography values occur on the eastern continental coast both in respect to relative and absolute topography with 458 to 459 gpdm. This indicates that the most intense cold outbreaks take place in the regions marked by very frequent cold air advection and associated low pressure aloft. The winter extremes are displaced with respect to the mean position of the cold pole somewhat to the east. The isohypse crowding in the extreme maps between 40 and 60° north latitude in the region of the east continental trough indicates the Atlantic or Pacific front and points to cyclonic activity in this area. The highest topography values, which give during this period maximum values of 600 gpdm occur in the subtropical high pressure region during the summer solstice when the sun's rays fall perpendicularly upon the horse latitudes. The areas over which the cold poles on the average lie were only slightly or not at all touched by the weakened warm air advance. Particularly marked main advance and extreme high pressure regions are not present in the Mediterranean region. The representation of extreme values in the

orm of maximum and minimum maps aids the forecaster in recognizing unusual weather situations and their unusual development. *Subject Headings:* **1. Upper air pressure variations 2. Tropospheric temperature variations.**—*I.L.D.*

12.1–285 551.510.522:627.81
Ogneva, T. A., **O raspredelenii meteoelementov nad vodoemami.** [Distribution of neteorological elements over reservoirs.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* 59(121):61–69, **1956.** 3 figs., 3 tables, 4 refs. **DWB, DLC**—The author analyzes the esults of an extensive series of measurements of wind velocity, air temperature and humidity over various heights above the water surface of Lake Krasavitsa and the Tsimlyansk reservoir arried out in May 1954, in order to determine the distribution of these elements in the atnospheric layer immediately above the water surface. The parameter p in the power law lescribing the vertical distribution of wind velocity, temperature and humidity of the air ıbove the surface, was found not to remain constant but to increase during instability and lecrease with a deepening inversion. There were no perceptible differences in the magnitudes f p was determined according to the distribution of wind velocity or of air temperature and ıumidity. The scattering of points was the result of diminished accuracy of computation in he case of small gradients of the several variables. The absolute value of p differed from the enerally accepted value by 8 units and for stable conditions $1/p=0.09$. If p is determined rom the temperature difference "water-air" in the zero and 2 m layer then its first approximaion is linear and $p=11.5+5.1(\Delta T/u_1^1)$. When p is computed for temperature differences at wo layers in air a nonlinear relationship is observed; it is more marked during unstable condiions and less marked during inversions. *Subject Headings:* **1. Vertical variations of meteoroogical elements 2. Tropospheric variations over reservoirs 3. Tsimlyansk Reservoir, Rostov Region, U.S.S.R.**—*I.L.D.*

12.1–286 551.510.528
Albert, Edward G., **A case study of the tropopause.** N. Y. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography. Contract AF 19(604)-1755, Scientific Report No. 6, July **1959.** 52 p. 22 figs., 4 tables, 18 refs. **DWB**—From detailed analyses f a warm homogeneous anticyclone it is shown that the generally accepted model of tropopause onfiguration away from the disturbing influences of fronts and jet streams is untenable. he tropopause is not found to be a smooth and continuous surface of lapse rate discontinuity. deep tropopause layer containing many such surfaces, some of small horizontal extent, is ıdicated. Additional analyses, in sub-polar and sub-tropical regions, indicate that this omplex type of tropopause layer may extend even into areas where individual soundings show single, unmistakable tropopause. *Subject Heading:* **1. Tropopause structure.** —*Author's bstract.*

12.1–287 551.510.528
Hsu, Pao-chin, **Some remarks on the analysis of upper troposphere and lower stratosphere.** *Meteorological Bulletin,* Taipei, Formosa, 5(1):26–34, **1959.** 18 figs., table, 6 refs. In Chinese; nglish summary p. 26. **DLC**—This paper first introduces the definition of the tropopause efined by GOLD and discusses its characteristics. The tropopause is not a surface of connuity and sometimes it may be superimposed by surfaces of different characteristics. The ırface always inclines from south to north and has a tendency to match with the gradient of obaric surface. Tropopause in sub-tropical belt has a height about 50,000′ with pressure 0 mb and potential temperature 390°A; in mid-latitude at a height about 40,000′ with ressure 200 mb and potential 350°A; in sub-Arctic region at about 30,000′ with pressure 300 mb ıd potential 310°A. In some cases, double tropopause may be appeared and overlapped one ıother. Isobaric levels of 100, 200 or 300 mb may be intersected with the tropopause. A opopause contour chart should be drawn before the actual position can be located. To onduct a jet flight, this line of tropopause discontinuity must be recognized before he can ssure himself of flying in the stratosphere or in the troposphere when his flying course is king a direction northward or southward. When a contour traverses the tropopause, in ost cases, there exists a tendency of cyclonic curvature in the north and of anticyclonic ırvature in the south. Wind velocity generally appears stronger on the north in a cyclonic

pattern but it shows stronger on the south in a anticyclonic pattern. The temperature and wind variation in upper troposphere and lower stratosphere are briefly discussed. Some analytical examples in North America had been reproduced for illustrations. Positions and characteristics of jet streams have also been explained in a concise form. *Subject Heading:* **1. Tropopause structure.**—*Author's abstract.*

12.1–288 551.510.53:541.12:551.508.822

Brown, John A. and Lavin, G. I., **Preliminary results obtained with catalytic surfaces in the upper atmosphere during balloon flights.** *U. S. Proving Ground, Aberdeen, Md. (Ballistic Research Labs.), Technical Note,* No. 1230, Dec. **1958.** 12 p. 5 charts (fold.), 6 refs. **DWB** (M10.535 U5853pr) –Using high altitude balloons, preliminary investigation of recombination rates of atomic particles and free radicals was performed by exposing radiosonde thermistor elements specifically vacuum coated with silver and aluminum oxide. Positive results were obtained by the silver coated thermistor while the Al_2O_3 coated thermistors showed negative readings as was expected. *Subject Headings:* **1. Photochemistry of upper atmosphere 2. Recombination rate measurements 3. Radiosonde chemical measurements.**—*Authors' abstract.*

12.1–289 551.510.53:551.543.1:551.547

Haurwitz, B., **The semidiurnal pressure oscillation in the stratosphere.** New York. Univ. College of Engineering. Research Div. Dept. of Met. and Oceanography, Contract AF 19(604)-1738, Scientific Report No. 7, Oct. **1958.** 15 p. fig., 5 tables, 3 refs., 10 eqs. **DWB**—The semidiurnal pressure oscillation has been computed for one station pair in the southern U. S. at the 250 mb and 175 mb level, and for another in the tropical Pacific at the 200 mb level. The accuracy of these values of S_2 is not very great because of the lack of sufficient data. However, they show that the pressure maximum is retarded aloft by about 1.5 hours, and that the amplitude increases upwards, in agreement with earlier conclusions based on data from the Caribbean. *Subject Headings:* **1. Semidiurnal pressure variations 2. Stratospheric pressure.**—*Author's abstract.*

12.1–290 551.510.53:551.507.352:061.6

Helliwell, N. C. (*Met. Office, Farnborough*), **Research at high altitudes by the Meteorological Research Flight.** *Weather,* London, 13(9):287–292, Sept. **1958.** 4 figs., 6 refs. **DWB**—The author describes some of the investigations made by the Meteorological Research Flight at Farnborough to study conditions in the upper troposphere and lower stratosphere. Mosquito and Canberra aircraft with ceilings of 40,000 and 50,000 ft respectively were used. Humidity measurements were made with the Brewer and Dobson frost-point hygrometer. The frost point at the tropopause was found to vary greatly but generally was comparatively low when the tropopause is high and vice versa. Above the tropopause the frost point falls sharply with height and since the temperature is nearly constant in this height range the relative humidity falls quickly to very low values. After this initial decrease the frost-point falls less quickly with height; from −50°C and −78°C it reaches a value of −83°C at 40,000 ft. For air to be as dry as indicated by a frost-point of −83°C the air temperature must sometimes have been near this value and probably a little lower. Such air temperatures are found normally only at the equatorial tropopause and in winter, at high levels over the poles. A series of latitudinal flights indicated that in the lower stratosphere the humidity in middle latitudes depends principally on the current synoptic situation. At higher levels near 48,000 ft the latitudinal variation is negligibly small and does not attain deductions on the meridional flow at these levels. The meteorological conditions under which condensation trails form were studied by means of a camera mounted on a Canberra and pointing backwards and graphs giving length of Canberra contrails for varying temperatures and humidities are presented. *Subject Headings:* **1. High altitude research 2. Airplane investigations 3. Frost point 4. Contrails 5. Farnborough, Eng.**—*I.L.D.*

12.1–291 551.510.53

*†Hulbert, E. O. (*Naval Research Laboratory, Wash., D. C.*), **Physics of the upper atmosphere.** *Meteorological Monographs* (American Meteorological Society), Boston, 3(12–20):160–181,

July **1957.** 20 figs., 9 tables, bibliog. p. 180–181, 18 eqs. **DWB, DLC**—A report on the progress in our knowledge of the upper atmosphere that has taken place during the interval 1951–1955. The status of our knowledge in this field as summarized in the **Compendium of Meteorology** is reviewed briefly. This is followed by a detailed account, accompanied by numerical data (presented in graph and tables), by equations and diagrams of the following subjects: pressure, density and temperature of the upper atmosphere, mass spectrographic and positive ion spectrographic measurements with rockets, spectrum of the sun outside the atmosphere, vertical distribution of atmospheric ozone, upper atmospheric temperature changes due to ozone, dissociation of oxygen in the upper atmosphere, the ionosphere, the D region ionization, normal and sporadic D region ionization, theory of E and F2 regions, temperature and density of the ionosphere under control of thermal conductivity, variations of the ionosphere and of the solar intensity with sunspots, the aurora, and magnetic self-focused solar ion streams as the cause of auroras. *Subject Headings:* **1. Upper atmosphere physics 2. Rocket spectrograph observations 3. Ionospheric ionization 4. Aurora.**—*I.L.D.*

12.1–292 551.510.536:546.17

Nicolet, M. (*Sec.-Gen. Spec. Comm. IGY, Brussels*), **Atomic nitrogen in the thermosphere.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 17(12), Special Supplement, Dec. **1958.** p. 36. 6 eqs. **DWB, DLC** -The following is offered as an example of the significance of individual research on general scientific progress. Whether or not atomic nitrogen is an important constituent of the thermosphere is not known. It results from ionization and subsequent dissociation recombination, not from direct dissociation of molecular nitrogen, hence $N_2+h\nu \rightarrow N_2^+ + e$ . . . (1); $N_2^+ + e \rightarrow N+N$ . . . (2). Atomic nitrogen reacts with molecular oxygen $N+O_2 \rightarrow NO+O$ . . . (3) and leads to nitric oxide in the thermosphere where the temperature is high. The activation energy of reaction (3) is of the order of 6 kcal, whereas between nitric oxide and atomic oxide <1 kcal.: $NO+N \rightarrow N_2+O$ . . . (4) leads to a simultaneous destruction of the new constituents; concentration of atomic nitrogen depends on solar energy for ionization of molecular nitrogen, nevertheless, concentration of nitric oxide is only related to the ratio of (3) and (4) depending on molecular oxygen concentration at a given temperature. Atomic nitrogen varies with solar activities and remains a minor constituent according to ratio (1) and (3). It is added that origin of nitric oxide ions (above 100 Km) is an interchange of $O^+ + N_2 \rightarrow NO^+ + N$ . . . (5) competing with $O^+ + O_2 \rightarrow O_2^+ + O$ . . . (6). *Subject Headings:* **1. Atomic nitrogen in thermosphere.**—*W.N.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Statistical theory of turbulence** (Taylor), 12.1–1; **Dynamic met.**, 12.1–3; **Thermal diffusivity of fabrics** (Powers, Botsch), 12.1–92; **Thermodynamics-atmos. pollution relationships** (Neuberger et al.), 12.1–280; **Cold front model** (Petkovšek), 12.1–309; **Air parcel motion** (Kao, Wurtele), 12.1–355; **Turbulent transfer** (Robinson), 12.1–360; **Convective heat transfer** (Nakagawa), 12.1–361; **Convective motion** (Förchtgott), 12.1–382.

12.1–293 551.511.2:531.65

Palmén, Erik (*Academy of Finland*), **On the maintenance of kinetic energy in the atmosphere.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 212–224. 8 figs., 2 tables, 20 refs., 16 eqs.) **DLC**—An attempt is made to compute or estimate the conversion between potential and kinetic energy in the Northern Hemisphere during the cold season. The conversion in the Trade-wind belt is computed from the work done by the mean meridional pressure forces acting upon the mean Hadley circulation, thus neglecting the conversions due to different types of disturbances of the mean flow. A tentative budget, considering only this part of the energy cycle and including the corresponding mean frictional dissipation of kinetic energy, is presented. The total net generation of 22×10^{10} kj sec^{-1}, according to previous computation by PALMÉN, RIEHL and VUORELA, is in fair agreement with the mean northward eddy flux of kinetic energy according to PISHAROTY. In middle latitudes conversions of potential energy into kinetic energy occur essentially in connection with disturbances of different types, corresponding to conversion of "available eddy potential energy" into "eddy kinetic energy" according to a scheme presented by STARR and LORENZ. Using as an example the release of kinetic energy in cyclone "Hazel" at the time when this was transformed into an extratropical cyclone, an estimate of the total conversion between potential and kinetic energy in middle and high latitudes is attempted using estimates of total frictional dissipation and the values for the influx of kinetic energy from the south. The results are necessarily extremely approximate, and the whole reasoning is in many respects rather speculative. *Subject Heading:* **1. Kinetic energy in the atmosphere.** —*Author's abstract.*

12.1–294 551.511.2:551.513.1:551.524.72:517.512.2

Van Mieghem, J.; Defrise, P. and Van Isacker, J. (*all, Met. Inst. Belgium, Brussels*), **On the selective role of the motion systems in the atmospheric general circulation.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 230–239. 10 figs., 11 refs., 9 eqs.) **DLC**—Harmonic analysis of the altitude and temperature fields at the 500 mb level along lat 50 and 55°N has been performed. Spectra of several quantities connected with the general circulation are used to investigate the relative role of different scales of motion systems. These quantities are the kinetic energy of the geostrophic motion and its meridional and zonal components, the flux of sensible heat and west momentum, the available energy and the baroclinicy. In each case, the respective contributions of the quasi-stationary waves and of the moving waves are distinguished. *Subject Heading:* **1. General circulation studies.**—*Authors' abstract.*

12.1–295 551.511.32:551.515.8:551.513.2:551.557.5

†Defant, Friedrich (*Intnatl. Inst. Met., Stockholm*), **On hydrodynamic instability caused by an approach of subtropical and polarfront jet stream in northern latitudes before the onset of strong cyclogenesis.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 305–325. 8 figs., 2 tables, 21 refs., 21 eqs.) **DLC**—Recent investigations of the General Circulation of the atmosphere (Fr. Defant, 1953 to 1958b) have shown the importance of strong northward advances of the subtropical atmosphere (subtropical impulses), appearing in connection with sudden northward meandering behavior of the subtropical jet stream, for the generation of large anticyclonic vortices (blocking anticyclones) over the mid-latitude belt. These processes had strong effect on the form of the polar-front jet, which assumes a more zonal form in northern latitudes (zonal circulation type, high index). The approach of subtropical and polarfront jet in northern latitudes and the simultaneous approach of subtropical and polar atmosphere results in a rather complicated vertical temperature structure of the total atmosphere. Nearly all of the meridional temperature contrast of tropospheric layers is concentrated at the strongly inclined polarfront, while in the higher atmosphere a steeply inclined part of the tropopause (opposite inclination relative to that of the polarfront) assumes a frontlike character separating relatively warm stratospheric polar air in the north from extremely cold air occurring in the higher parts of the subtropical troposphere in the south. This special kind of vertical structure of the total atmosphere in combination with double windmaxima (polarfront and subtropical jet) was observed to explode during a short time of some hours and at the same time unusual strong cyclogenesis occurred, especially at the northeastern edges of the extensive blocking anticyclones. As a result of the formation of large cyclones drastic changes in the form of polarfront jet occurred or, what is the same, the type of circulation changed drastically (from a zonal into a strongly meandering form of polarfront jet, from high to low index circulation). A combined synoptic-theoretical study of the hydrodynamic equilibrium of these special atmospheric systems by means of a detailed vertical cross section south of Iceland before the onset of strong cyclogenesis on Jan. 8, 1956, 0300z is the content of this paper. The principal results are the following: 1. It is demonstrated that the atmospheric system under consideration is hydrodynamically unstable in three special regions: (a) in the middle and upper part of the polarfront and just below the lower boundary of the polarfront, (b) just south of the main core of the polarfront jet and most important (c) in an upper layer between the maximum wind and the tropopause. 2. This is even true if the stratification of the atmosphere is assumed to be statically stable and no anticyclonic curvature of the flow is taken into account. In case of

no such restrictions and the hydrodynamic equilibrium of the system would be even more unstable. 3. A computation of the Richardson Number Ri shows that regions with $Ri<1$ are exactly consistent with the three regions of hydrodynamic instability and agree well with the observed regions of severe turbulence near to the polarfront jet core, especially with respect to the upper instability region just below the tropopause. 4. Important aspects for drastic changes in the character (zonal or meridional) of the polarfront jet circulation, for strong cyclogenesis resp. are outlined. *Subject Headings:* **1. Jet stream effects on cyclogenesis 2. Instability 3. Cyclogenesis.**—*Author's abstract.*

12.1–296 551.511.32:551.513.2:551.557.5:551.515.8

Defant, Friedrich, **Die Westwärts-Intensivierung des Polarfront Jetstream in den Winkel zwischen Polarfront und Tropopause an der Ostseite eines polaren Kälteausbruchs, eine Erweiterung des klassischen Grenzflächenproblems von Margules.** [The westward intensification of the polar front jet stream at the intersection of the polar front and the tropopause on the east side of polar outbreaks: an extension of Margules' classical boundary layer problem.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 11(2):197 217, **1959.** 7 figs., 7 refs., 52 eqs. German, English and French summaries, p. 197–198. **DWB, DLC**—Based on purely dynamical reasoning an explanation for the strong "westward-intensification" of the polar front jet stream into the angle between the inclined polar front surface and the opposite inclined tropopause on the eastern side of an outbreak of cold polar air is presented. Certain similarity of the structure of the atmosphere with that of the ocean in the main core of the Gulf Stream has guided me to apply the inertial boundary layer theory of J. CHARNEY (1) to such an atmospheric system. A three-layered model of the atmosphere has been developed and corresponding equations of motion were derived, which allow to handle the problem according to the solution of CHARNEY. The comparison with the slopes of polar front and tropopause according to the observations and with the observed "westward intensification" of the flow is rather satisfactory. However, we must understand that this theory only considers the dynamical side of the phenomenon and does only approximately account for the important contribution of thermodynamic processes by the use of the rather simple model. *Subject Headings:* **1. Westward intensification of polar front jet stream 2. Margules' formula 3. Boundary layer.**—*Author's abstract.*

12.1–297 551.511.6:517.512.2

Platzman, George W. (*Univ. Chicago*), **A solution of the nonlinear vorticity equation.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 326–332. 5 figs., 4 refs., 6 eqs.) **DLC**—A solution of the barotropic nondivergent vorticity equation is proposed in which the coefficients of a Fourier representation of the solution are developed as series of powers of a parameter. The motion is an invariant wave propagation, and the analysis is restricted by the "beta-plane" approximation. *Subject Heading:* **1. Barotropic vorticity equations.**—*Author's abstract.*

12.1–298 551.511.6:551.524.2/4:551.554:551.551.2

Tarnopol'skiĭ, A. G., **Sovmestnoe opredelenie profileĭ meteorologicheskikh elementov i kolichestvennykh kharakteristik turbulentnosti v pogranichnom sloe atmosfery.** [Simultaneous determination of the profiles of meteorological elements and quantitative characteristics of turbulence in the boundary layer of the atmosphere.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 77:72–75, **1958.** 3 refs., 14 eqs. **DWB, DLC**—In this paper, D. L. Laikhtman's formula for determining the coefficient of turbulence for the initial mixing layer for a given temperature distribution was solved for a more general case when the horizontal pressure gradient varies linearly with height and not merely for a thermally homogeneous air mass when the horizontal pressure gradient is independent of height. The case examined in this article involves a horizontal temperature gradient that does not vary with height. It is assumed that the thermobaric field at the earth and the vertical profile of temperature are known and it is necessary to find the vertical distribution of wind, the value of the coefficient of turbulence and the height of the layer near the ground. *Subject Headings:* **1. Turbulence coefficient calculations 2. Temperature gradient effects on turbulence.**—*I.L.D.*

GENERAL CIRCULATION

See also: **Solar effects on atmos. circulation** (Vitel's), 12.1-121; **Ocean-atmos. interaction, Pacific** (Hanzawa), 12.1-175; **General circulation studies** (Van Mieghem et al.), 12.1-294; **Westward intensification of polar front jet stream** (Defant), 12.1-296; **Circumpolar westerlies** (Vadhanapanich), 12.1-417.

12.1-299 551.513.1

Charney, Jule (*M. I. T., Cambridge, Mass.*), **On the general circulation of the atmosphere.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 178-193. 8 figs., table, 27 refs., 5 eqs.) **DLC**—A model of the general circulation of the atmosphere is constructed in the following manner: The energy sources are determined on the assumption that the atmosphere is isothermal, transparent to solar radiation and "grey" to terrestrial radiation, and that the earth has zero heat capacity. Energy dissipation is provided for by a correspondingly simplified frictional mechanism. On the basis of these assumptions the steady, zonally symmetric circulation is calculated for a simple geometry. This circulation is found to be unstable with respect to asymmetric wave perturbations, and the form of the most unstable perturbation is calculated by solving numerically the small amplitude perturbation equations for a coarse grid. It is next assumed that the perturbation grows in amplitude while retaining its shape, modifying the zonal flow by the action of eddy stresses and eddy conduction of heat, until the rate at which it receives potential energy from the zonal flow just balances the rate at which it loses potential energy by radiative equalization of temperature and the rate at which it loses kinetic energy by the work of the Reynolds stresses on the zonal flow and by frictional dissipation. The mean zonal velocity and temperature profiles for this new equilibrium state are calculated from the momentum and heat equations as functions of the amplitude of the wave perturbation. The amplitude is then determined from the energy balance condition, and both the perturbation and the mean zonal flow are calculated. The resultant circulation is found to be similar to that obtained by PHILLIPS (1956) in his well-known numerical experiment and to have about the same degree of verisimilitude. It is pointed out, however, that the fluctuating motion in the actual atmosphere is better described by a system consisting of two or more perturbation modes and a zonal flow in mutual interaction. The results of a barotropic numerical integration made some years ago in Princeton are presented as an example of the type of interaction that might be expected to occur. *Subject Heading:* **1. General circulation models.**—*Author's abstract.*

12.1-300 551.513.2:551.515.8

Queney, Paul (*Faculty Science, Paris*), **Explication dynamique de la circulation générale de l'atmosphère sur la base des idées de Rossby.** [Dynamic interpretation of the general atmospheric circulation based on Rossby's ideas.] (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 225-229. 3 figs., 3 refs.) **DLC**—ROSSBY was the first to suggest that, owing to earth's curvature, the Reynolds' stresses due to large-scale meridional exchanges (operated by the Perturbations superimposed on the general circulation) are quite different in nature from the molecular-viscous stresses, and that instead of damping the air motions they can create or maintain such winds as the jet streams. If the assumption is made that the exchanges are mainly due to the tropical perturbations, then a very simple dynamical theory can be built accounting for all the characteristic properties of the general tropospheric circulation (meridional as well as zonal circulation), and summarizing as follows: 1. The tropical perturbations are permanently producing in the upper troposphere a system of Reynolds' stresses which in the average are directed eastward at middle latitudes and westward at low latitudes. The first consequence is the production of the observed zonal winds. 2. Under the effect of the unbalanced geostrophic force applied to them, these winds are deflected anticyclonally, therefore, they converge toward subtropical latitudes and diverge above polar fronts, and this in turn explains the tricellular meridional circulation which in each hemisphere accounts for the general distribution of rainfall and deserts. 3. As a result of this meridional circulation the isotherms are concentrated horizontally above subtropical latitudes, also in the polar fronts during winter, and finally this concentration probably explains the jet streams. This theory may be considered as revolutionary, but it is apparently the only possible one: a purely thermal theory would lead to an unacceptable meridional circulation, and the assumption (made by ROSSBY) of exchanges mainly due to polar-front perturbations makes impossible any explanation of the belt of westerlies. *Subject Headings:* **1. General circulation theories 2. Polar front theories.**—*Author's abstract.*

ATMOSPHERIC DISTURBANCES

See also: **Storm surge computation** (Krylov), 12.1–179; **Storm analysis, Israel** (Aelion), 12.1–254; **Hurricane "Helen," 1958** (Howell), 12.1–267; **Jet stream effect on cyclogenesis** (Defant), 12.1–295; **Polar front theories** (Queney), 12.1–300; **Turbulence-front relationships** (Turner), 12.1–337; **Cyclone circulation** (Mulky, Banerji), 12.1–342; **Storm surges** (Donn, McGuinness), 12.1–351; **Air parcel trajectories** (Kao, Wurtele), 12.1–355; **Thermal convective currents** (Tippelskirch), 12.1–362; **Atmos. disturbances, French Polynesia** (D'Hauteserre), 12.1-397; **Orographic effects on westerlies** (Vadhanapanich), 12.1–417; **Potential gradient-weather relationships** (Gherzi, Keller), 12.1–428; **Tornado theories** (Vonnegut), 12.1–430; **Thunderstorm activity** (Brook, Kitagawa), 12.1–432.

12.1–301 551.515.21:551.543.6(759)

Frank, Neil L. and Jordan, C. L., **Climatological aspects of the intensity of typhoons Florida.** State Univ. (Tallahassee). Dept. of Meteorology, Contract Cwb-9395 and Contract Cwb 9683, [Unnumbered] Scientific Report, Oct. 1, **1959.** 19 p. 8 figs., 2 tables, 9 refs. **DWB** (M(051) F636cL). Also issued as *U. S. Weather Bureau, National Hurricane Research Project Report* No. 36, Feb. **1960.** 16 p. 8 figs., 3 tables, 9 refs. **DWB** (M15.2 U5845r)—Some aspects of the intensity of typhoons have been investigated by utilizing central pressure data observed during the period 1950–1957. Interannual and seasonal changes in the frequency of storms of different intensities are examined and compared with statistics relating to typhoons of all intensities covering a much longer period. Geographical aspects of typhoon formation and intensity have been investigated by plotting the formation points and the points of minimum pressure of individual typhoons and by preparing maps depicting the frequency of typhoons of different intensities. *Subject Headings:* **1. Typhoon intensities 2. Pressure distribution in typhoons 3. Florida.**—*Authors' abstract.*

12.1–302 551.515.21(263,261)

*Graham, Howard E. (*Hydromet. Section, Hydrologic Services Div.*) and Nunn, Dwight E. (*Off. of Chief of Engineers, Dept. of the Army*), **Meteorological considerations pertinent to Standard Project Hurricane, Atlantic and Gulf coasts of the U. S.** *U. S. Weather Bureau, National Hurricane Research Project Report*, No. 33, Nov. **1959.** 76 p. 49 figs., 11 tables, 7 refs., 7 eqs. **DWB** (M15.2 U5845r)—A study of hurricane characteristics in the coastal areas of the Atlantic and Gulf of Mexico was jointly undertaken by representatives of the Hydrometeorological Section, U. S. Weather Bureau and the Office of Chief of Engineers, Corps of Engineers during 1955, in order to provide a correlation of such characteristics in one area with the probabilities of occurrence in other regions of the country. The report gives special wind analysis pertinent to the determination of wave and tidal effects of specific locations. Many illustrative hurricane characteristics are correlated with intensity criterion, latitude, and other features. The report shows a generalized procedure for determining the Standard Project Hurricane for the Atlantic and Gulf Coasts. *Subject Headings:* **1. Hurricane studies 2. Atlantic Coast, U. S. 3. Gulf Coast, U. S.**—*N.N.*

12.1–303 551.515.2:551.556.1(494)

Aubert, Cyril, **La tempête du 10 août 1959.** [The storm of Aug. 10, 1959.] *Schweizer Aero-Revue*, Zurich, 35(5):313–316, May **1960.** 3 figs. **DLC**—Description of the hurricane which swept through Switzerland on Aug. 10, 1959 and caused numerous damages, particularly in the region of Lausanne. In this region the wind reached a speed of 130 km/h; trees were uprooted, ships were sunk on Leman Lake, people were killed, and others were drown or badly wounded. Such a violent hurricane is exceptional in Switzerland. It was bound to the passage of a squall line which after having crossed Europe acquired its maximum translation speed in Switzerland where it moved about at a speed of 80 to 100 km/h. The detailed examination of the origin and development of this phenomenon has shown that it originated in a cold drop which had formed gradually over Spain. The formation of such a cold drop is bound to the quasi-permanent presence during summer of a small depression on the Spanish plateaus due to the heating of the soil. After a formation period on Aug. 2 and 3, when the small Spanish thermal depression was fed on two occasions by cold air coming from SW of Great Britain, the cold front displaced NE-wards by successive jerks, during which periods of standing and less important activity were interspersed. The forecast of these South-West stormy squalls is very difficult, as their evolution is very irregular. *Subject Headings:* **1. Hurricane damage reports 2. Hurricane genesis 3. Hurricane tracks 4. Switzerland.**—*A. V.*

12.1–304 551.515.4:778.3

Feteris, P. J., **Het fotograferen van nachtelijke onweders op grote afstand.** [The photographing of thunderstorms during night at great distances.] *Hemel en Dampkring,* The Hague, 58(4):95–96, April **1960.** fig. **DWB, DLC**—The very rapid films make it possible for the amateur meteorologist to photograph thunderstorms during the night at a great distance. This photographic material is a very important aid to the research by electronic instruments which shows some lacunas. The author gives some instructions about the photographs: 1) date, place and hour of observation of the thunderstorm; 2) direction of the thunderstorm; 3) lense of the camera and 4) the most favorable size. *Subject Heading:* **1. Thunderstorm photography.**—*A. V.*

12.1–305 551.515.8:551.577:551.515.4

Fujita, Tetsuya (*Univ. of Chicago*), **Precipitation and cold air production in mesoscale thunderstorm systems.** *Journal of Meteorology,* Boston, 16(4):454–466, Aug. **1959.** 13 figs., 3 tables, 15 refs., 28 eqs. **DWB, DLC**—This paper presents a proposed mechanism of cold air production associated with precipitation. A dome of cold air is produced by the evaporation of raindrops falling beneath the cloud base. A quantitative relationship between the evaporated rain and the produced excess mass of cold air was obtained, which showed that the mass is directly proportional to the evaporation. The coefficient of proportionality is a dimensionless number which varies between 0 and 1 depending on the temperature lapse rate originally existing beneath the cloud base. Results of mesoanalyses of squall lines and thunderstorms were used to estimate the actual amount of evaporation. The mass ratio of evaporated rain to the surface rain was found to increase with the height of the cloud base, reaching 1.0 at a cloud base of 9000 ft. In-cloud evaporation obtained by BRAHAM (1952) showed a very good agreement with the values obtained in this study. (For abstract from another source, *see* 10B–179, Feb. 1959, *Met. Abstracts.*) *Subject Headings:* **1. Cold air formation 2. Evaporation of raindrops 3. Mesoanalysis of thunderstorms.**—*Author's abstract.*

12.1–306 551.515.8:550.342

Lacaze, Jean, **Les fronts froids générateurs de microséismes.** [Cold fronts as generators of microseisms.] *Académie des Sciences, Paris, Comptes Rendus,* 250(4):739–740, Jan. 25, **1960.** 7 refs. **DWB, DLC**—The study of cold fronts generators of microseisms makes it possible to formulate certain considerations regarding the structure and evolution of this type of front. The study of microseisms proves that near the coasts, there is a reinforcement of the fronts which may be marked by a "characterization at soil level." There is also often a characterization when the cold front arrives at the sea after having crossed a sufficiently vast island (Iceland) or a sufficiently important relief (Scotland). Over the open sea, the appearance of a cold front "characterized at soil level" is concomitant with the deepening of the undulation or of the low pressure center to which it is bound. The existence of frontogenesis is established at the time of very strong subsidence of dry cold air which may be from stratospheric origin. Such fronts can cross the entire troposphere, and clearly distinguish themselves from the fronts of the lower layers. Their hydrodynamic relationship appears when there is, for the latter, subsidence of cold air after having passed over an important relief. From the physical point of view, the soil level characterized cold fronts appear as density currents bouncing on the soil (or sea surface). *Subject Headings:* **1. Microseisms-cold front relationships 2. Cyclonic microseisms.**—*A. V.*

12.1–307 551.515.8:551.515.13

Leonov, M. P., **Kholodnyĭ front v peredneĭ chasti tsiklona.** [A cold front in the forward part of a cyclone.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:37-40, **1958.** 5 figs. **DWB, DLC**—A cyclone passed over the Baltic Sea during Jan. 3–4, 1954 and produced snowfall and storms. The movement of the front in this cyclone, which displayed certain peculiarities, is described in this study. The cyclone moved in a direction opposite to the isobars of its warm sector from Jan. 2 to Jan. 4, 1954; the front in the anterior part of the cyclone was cold and not warm as was to be expected; on the Leningrad meridian the front moved southward 700 km/day, on the Archangel meridian it moved 500 km/day; at the earth's surface the cyclone moved opposite to the flow aloft above its center. The movement of the front in the anterior part of the cyclone is explained by the fact that at the surface of the earth in the northeast quadrant of the cyclone, the wind in the cold air mass was normal to front with a velocity of 3-7 met/sec. In the free atmosphere the front lay in the northern flow and it was a cold front, since heat advection occurred only in the southeast part of the warm sector but at the front thermal advection was close to zero; aloft at the front considerable cold advection was present. In the frontal zone and in the warm mass the temperature changed only by ±4°C; behind the front it fell by 8–20°C. Similar movements of fronts were observed in western parts of anticyclones during ultrapolar incursions or in the case anomalous cyclones moving across European USSR from southeast to northwest. For these fronts the transition from a warm to a cold front, or vice versa, was observed when the direction of isallobaric gradient alters in a corresponding manner and the nature of the thermal advection aloft altered. Aerological sections along the lines Murmansk, Kem, Sortavala, Leningrad, Pskov and Riga according to observations Jan. 3 (evening) and Jan. 4 (morning), 1954 confirming this analysis are presented. *Subject Headings:* **1. Cold fronts 2. Cyclone movement 3. Cyclone-cold mass relationships 4. U.S.S.R.**—*I.L.D.*

12.1–308 551.578.45:551.515.8:551.524.36(584.6)

Nikolaev, V. A., **Maĭskie kholoda v iuzhnom Kazakhstane,** [May cold in southern Kazakhstan.] *Priroda*, Moscow, No. 5, 124-125, May **1958.** fig. **DWB, DLC**—After a rapid development of spring, which had begun at the end of April 1957, a sudden cold spell occurred on May 11. Snow began to fall and night temperature fell to 3°C. By the following day 5–7 cm of snow had accumulated at Alma-Alta. The snow was heavier on the Zailiisk Altai Mountains. On May 13 wet snow continued to fall and the temperature hovered around 0°C. Gradual warming began the following day. This rare case of May snowfall and frost was the result of a strong incursion of an Arctic air mass from the Taimyr Peninsula and the Kara Sea into Kazakhstan and Central Asia. It was accompanied by strong northerly and northwesterly winds and night frosts. Periodic Arctic incursions are characteristic of the climate of Kazakhstan and Central Asia. They are frequent and usual in March and beginning of April. The accompanying snow is termed in Central Asia "apricot drying" snow (yriuchnyi) since it falls during the apricot blossoming season. *Subject Headings:* **1. Snowstorms in spring 2. Cold spells 3. Arctic air masses 4. Kazakh S.S.R.**—*I.L.D.*

12.1–309 551.511:551.515.83:551.43

Petkovšek, Zdravko, **Verspätung der Kaltfront an orographischen Hindernissen.** [Retardation of cold front due to orographic obstacles.] *Meteorologische Rundschau*, Berlin, 11(4):123–127, July/Aug. **1958.** 6 figs., 2 tables, 7 refs., 45 eqs. **DWB, DLC**—By means of an idealized model of a cold front, which encounters an obstacle, equations are developed for computing the retardation of a cold front, that is the retardation of the incursion of cold air into the region lying directly behind the obstacle. Two possibilities of changes of the frontal inclination were considered, namely, retardation in the case of horizontal filling and retardation in the case of constant inclination. Under special conditions also negative retardation is possible, in other words the cold air extends beyond the obstacle sooner, as if the obstacle were not there. This explains the fact that a cold front moves more rapidly across an obstacle than in flat surface. In addition corrections for adiabatic ascent are introduced into the original equations. The equation for determining the time of retardation of the cold front before and after the adiabatic correction are presented, and an example illustrating the computation of retardation of a cold front in its passage from Ljubljana across Munich and Frankfurt a.M. to the sea, is presented. *Subject Headings:* **1. Cold front models 2. Cold front retardation by orographic obstacles 3. Germany.**—*Transl. of author's summary and I.L.D.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Snow cover radiation, Maudheim** (Liljequist), 12.1–26; **Radiation climate of fields** (Rusin), 12.1–57; **Sources of solar corpuscles** (Mustel), 12.1–115; **Solar X-ray emission** (Friedman, Chubb), 12.1–116; **Solar flare effects on cosmic radiation** (Malurkar), 12.1–117; **Corpuscular radiation effects on comets** (Biermann, Lust), 12.1–133; **Scanning the sun** (Christiansen, Mathewson), 12.1–135; **Geomag. effects on cosmic rays** (Simpson), 12.1–147; **Solar Lyman α radiation** (Mercure et al.), 12.1–152; **Sky temp. measurement** (Tanaka, Kakiuuma), 12.1–224; **Sky brightness measurement** (Riblet), 12.1–239; **Sunshine duration charts** (Steinhauser), 12.1–402; **Solar radiation variations** (Simpson), 12.1–405.

12.1–310 551.521.11(64)

*Emon, J., **Premières mesures d'insolation au Maroc.** [First measurements of insolation in Morocco.] *La Météorologie*, Paris, Ser. 4, No. 55:237–246, July/Sept. **1959.** 4 tables, 11 refs. French, English and Spanish summaries. **DWB.** Also issued as monograph by: Casablanca, Morocco. Meteorological Service, **1959.** 12 p. Mimeo.—The results of the first measurements of insolation made with a Jordan heliograph at 16 stations of the main synoptic network in Morocco are successively dealt with from the following standpoints: duration of insolation, fraction of insolation, number of days of zero insolation and number of days of continuous insolation. The annual duration of insolation, which ranges about from 3100–3200 hours, presents only a very slight regional variation. The annual variation is characterized by a winter minimum (December to February) and a summer maximum (June–July). The minimum monthly means are comprised between 124 and 212 hours and the maximum monthly means between 313 and 415 hours. The annual average fraction of insolation ranges about 70%. The annual average number of days with zero insolation is very weak and varies between 4 and 10 and without any well marked geographical variation. The annual average number of days with continuous insolation, which presents a certain variability, is generally comprised between 50 and 100. *Subject Headings:* **1. Sunshine duration data 2. Morocco.** —*A.V.*

12.1–311 551.521.12(73)

Lippmann, Harold S. (*U. S. W. B., Wash., D. C.*), **Means of daily solar radiation for United States stations.** *U. S. Weather Bureau, Weekly Weather and Crop Bulletin*, 46(7):7–8, Feb. 16, **1959.** table, 6 refs. **DWB, DLC**—The use of two standard scales of radiation in the solar radiation research in different parts of the world hampered progress until the International Radiation Conference, Davos, Switzerland, recommended the adoption and use of an "International Pyrheliometric Scale 1956." The two old scales were the original Ångstrom Scale and the Smithsonian Scale of 1913. The latter was in use in the U. S. before the conference. During the IGY the U. S. Weather Bureau adopted the new scale. Various cooperators that furnished solar radiation data converted their data to the new international scale. The report describes how to use the new scale to arrive at the 4-year or 5-year means of daily solar radiation. The 1953–57 mean daily hemispheric solar radiation for several stations in latitudes 25°N to 30°N; 30°N to 35°N; 35°N to 40°N; 40°N to 45°N; 45°N to 50°N are tabulated. *Subject Headings:* **1. Solar radiation data 2. Daily solar radiation means 3. International Pyrheliometric Scale 1956 4. United States.**—*N.N.*

12.1–312 551.521.16

Nagel, M. R. (*A. F. Cambridge Res. Ctr., Bedford, Mass.*), **Illumination, contrast, spectrum, and color conditions in an "average" outdoor scene as functions of ground reflectance, object orientation, and viewing direction.** *Optik*, Stuttgart, 16(12):697–724, Dec., **1959.** 29 figs., 10 refs. German and English summaries. **DLC**—In the report, an attempt is made to define the concept of an "average" outdoor scene for application in the development of photographic equipment and material. The average outdoor scene consists primarily of a white sphere on a neutral gray or white ground under a clear sky at a sun altitude of 40 degrees. The distribution of illumination, reflection spectra, and color on the surface of such an object is investigated. The contrast (on exposure range) and the spectral uniformity of the illumination on the object are determined as a function of both the ground reflectance and the direction from which the object is photographed or viewed. *Subject Headings:* **1. Outdoor illumination 2. Ground reflectance 3. Albedo.**—*Author's abstract.*

12.1–313 551.521.16

†Dourgnon, Jean, **Les réflexions mutuelles entre surfaces diffusantes.** [Mutual reflections between diffusing surfaces.] *Revue d'Optique*, Paris, 38(8):365-394, Aug. **1959.** 11 figs., 5 tables, 55 refs., eqs. French and English summaries p. 365. **DLC**—Modern calculation methods permit a new approach to the problems of mutual reflections by means of differences equations. Under the assumption that each independent surface receives a total uniform illumination, substituted for the more immediate assumption that direct illuminations are uniform, it is possible to reasonably reduce the number of surfaces to be considered. A particularly simple solution of this problem is provided by the use of matrix notation and by postulating and exchange function which is more and more used in radiation phenomena. Numerical values are obtained either with a digital computer or an analogue computer in application of Kirchhoff's electric network laws. Both methods are suitable within their own range. Some applications of the foregoing ideas concern the illumination engineering with special attention given to certain unpublished studies undertaken at the Centre Scientifique et Technique du Bâtiment: 1) Comparison of numerical data derived from the integral equation (allowing for the error due to this equation) 2) Application to natural and artificial illumination within the programme of the C.I.E. proceedings. *Subject Headings:* **1. Illumination theories 2. Kirchhoff's laws 3. Building illumination.**—*Author's abstract.*

12.1–314 **551.521.17**:535.33

Kachalov, V. P.; Pavlenko, N. A. and Iakovleva, A. V., **Ul'trafioletovyi spektr Solntsa v oblasti 2471–2635 Å.** [Ultraviolet solar spectrum in the region of 2471–2635 Å.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 9:1099–1104, Sept. **1958.** fig., table, 6 refs. **DLC**—In 1956 ultraviolet spectra of the sun were photographed in the wave length region from 2471 to 2635 Å. Fourteen spectrograms at heights up to 100 km were obtained. A preliminary list of the lines in the region of the spectrum 2471–2635 Å is presented. The spectrograph and the construction of the list are described. The list contains, for each wave length, the intensity character and true identification. *Subject Heading:* **1. Ultraviolet spectra.**—*I.L.D.*

12.1–315 535.147 **551.521.18**:551.508.25

Hadni, Armand; Janot, Christian and Decamps, Edmond, **Spectrométrie dans l'infrarouge (50 à 350μ).** [Infrared spectrometry (50 to 350μ).] *Revue d'Optique*, Paris, 38(9–10): 463–474, Sept./Oct. **1959.** 25 figs., 11 refs. French and English summaries p. 463. **DLC**—A grating spectrometer for the far infrared is described. It is a small size instrument enabling quick measurements and using a miniature grating and carefully calculated filters. This spectrometer comprises 4 superposed filters. Adding a supplementary filter, it shows that: a) the aspect of the spectrum is not altered; b) contrary to what could be thought, the transmission of each of them in the far infrared is superior to 50%. The author investigates the rotation spectrum of water vapor. The preliminary results obtained are: a) the far infrared reflection on echelette gratings; b) the absorption of 23 organic and inorganic substances. *Subject Headings:* **1. Infrared spectroscopy 2. Grating spectrometers 3. Interferential filters.** —*A.V.*

12.1–316 551.521.32

Lönnqvist, Olov, **Estimation of nocturnal net radiation: computations made in connection with microclimatological observations in Ultuna.** *Sweden. Meteorologiska och Hydrologiska Institut. Meteorologiska Byran, Notiser och Preliminära Rapporter*, 2(5), **1959.** 6 p. 2 tables, 7 refs., 9 eqs. **DWB** (M(055) S974no)—A discussion of the estimation of nocturnal net radiation, based on observations of temperature, humidity and cloudiness, in connection with microclimatologicalobservations carried out at Ultuna by Torssell (1959). Estimation procedures in the case of a cloudless atmosphere as well as a cloudy atmosphere are discussed and the estimated values of radiation are reported and tabulated. Observed and computed values for various parameters determining the net radiation are compared. The agreement between estimated net radiation and the heat flux during nights without any wind or any significant snow cover is found to be relatively good. *Subject Headings:* **1. Nocturnal radiation calculations 2. Ultuna, Sweden.**—*I.S.*

12.1–317 551.521.**67**:551.510.**53**:551.515.**727**

§Rakipova, L. R., **Vliiania korpuskuliarnykh potokov na dinamicheskie vozmushcheniia v verkhneĭ atmosfere.** [Influence of corpuscular currents on dynamic disturbances in the upper atmosphere.] (In: Akademiia Nauk SSSR. Komissiia po Issledovaniiu Solntsa, **Fizika solnechnykh korpuskuliarnykh potokov i vozdeĭstvie na verkhniuiu atmosferu zemli.** Moscow, **1957.** p. 273–276. 4 figs., 3 refs.) **DLC** (QB531.A5)—In 1951 (*G.G.O.*, *Trudy*, 28(90)) the author proposed a model of the dynamic structure of the entire atmosphere above tropospheric cyclones or anticyclones. In this model a surface cyclone would be superposed by an anticyclone in the lower stratosphere, a cyclone in the middle stratosphere (20–50 km), an anticyclone in the upper stratosphere (50–100 km) and a cyclone in the ionosphere (100–250 km). The reverse situation would occur above a tropospheric anticyclone. This model would permit a warming or cooling in any one of the layers to reverse the situation in all other layers, either above or below. The tropopause circulation and baric field on May 17, 1949 is used as an illustration of relation of tropopause to surface isobars on a synoptic chart, the possibility of solar U.V. and corpuscular bursts heating a layer of the stratosphere and thus altering the circulation pattern is noted. *Subject Headings:* **1. Solar corpuscular influences on upper atmosphere 2. Anticyclones.**—*M.R.*

TEMPERATURE

See also: **Surface inversions, Maudheim** (Liljequist), 12.1–26; **Frost damage to vineyards** (Weise), 12.1–53; **Frost protection of vineyards** (Witte), 12.1–54; **Frost protection of plants** (Weise), 12.1–55; **Thermal diffusivity of fabrics** (Powers, Botsch), 12.1–92; **Solar variation effects on temp.** (Abbot), 12.1–118; **Heat exchange air-water surface** (Nesina), 12.1–209; **International unit of absolute temp.** (Bodea), 12.1–240; **Upper air temp forecasting** (McRae, Phillpot), 12.1–253; **Nocturnal cooling** (Reuter), 12.1–256; **Trop. temp. variations** (Wollschläger), 12.1–284; **500 mb temp. field** (Van Mieghem et al.), 12.1–294; **Temp. gradient effects on turbulence** (Tarnopol'skiĭ), 12.1–298; **Cold spells, Kazakh S.S.R.** (Nikolaev), 12.1–308; **Mean temp. field** (Chen), 12.1–339; **Heat transfer** (Robinson), 12.1–360; **Thermal convective currents** (Tippelskirch), 12.1–362; **Annual temp. variations, Iberian Peninsula** (Lautensach), 12.1–398; **Cold winters, Austria** (Dolezal), 12.1–404; **Pleistocene temps.** (Simpson), 12.1–405; **Cave temps.** (Popescu), 12.1–411; **Equivalent temps., Vienna** (Undt), 12.1–415; **Topographic effects on temp., Bashkir A.S.S.R.** (Lysak), 12.1–416; **Cover effects on frost damage,** 12.1–418.

12.1–318 551.524.**34**:551.583.**3**(98)

*Lange, Richard (*Hamburg*), **Zur Erwärmung Grönlands und der Atlantischen Arktis.** [Warming of Greenland and the Atlantic sector of the Arctic.] *Annalen der Meteorologie*, Hamburg, 8(9/10):265–304, **1959.** 13 figs., 9 tables, 15 refs. German summary p. 265. **DWB, DLC**—The development of the temperature conditions of Greenland and of the Atlantic sector of the Arctic is continued up to the most recent time, 1958. The atmospheric temperature was investigated by means of 10 year and 30 year maxima means of January, July and mean annual temperature including the period 1941–1945 for which observational data are lacking for Spitsbergen and Bear Island, but for which the gaps were made up by extrapolation. The temperature variation in 30 year means confirms in all Arctic stations the results of Lyzgaard, who found a warming of the air temperature in the Arctic during the period 1881–1910 and 1917–1940. This warming up has continued but at a lower rate. Summation curves of deviation from the normal value (30 year mean 1901–1930) showed that Jakobshavn was too cold between 1880 and 1899 and 1917 and 1922 and too warm between 1922 and 1936 and for several years up to 1954. In Hamburg the cold periods terminated in 1893 and the very warm periods were considerably shorter 1910–1914, 1934–1939 and 1943–1954. The 30 year moving mean of the July temperature for Greenland shows a general rise since 1926 but less than in the annual mean. In the 10 year moving mean the rise around T_{1926} is not uniform: Ivigtut and Angmagssalik have a maximum at T_{1920} which is lacking in northwest Greenland and Spitsbergen. According to summation curves of temperature deviations from the "normal" mean (1901–1930) July is too warm since 1926 in west and east Greenland and since 1917 in Hamburg where it continued to be too warm until 1948; in the former it continued to be too warm from 1926 to 1940 and from 1946 to 1953. In January slight warming began with local variations in 1931 but an intense temperature rise has set in: up to now it has exceeded 6°C in northwest Greenland. The summation curves of January for Jakobshavn shows very cold Januaries up to 1911. The very warm Januaries began in the second quarter of the 20th century. For Hamburg the very cold January continued from 1879 to 1897, but warm Januaries occurred only between 1926 and 1936. Analysis of temperature variations show an Atlantic-Arctic phase which extends to northern and central Europe and is distinctly different from the western Greenland phase. In the north fluctuations are greater than in the south and in winter considerably greater than in summer. They are not uniform in all months. Extensive data on the secular variation of atmospheric temperature are presented in the form of tables and in graphs of 10 year and 30 year moving annual and monthly means. *Subject Headings:* **1. Warming of Arctic 2. Greenland 3. Arctic.**—*I.L.D.*

12.1–319 **551.524.34**:**551.583.3**(42)

†Manley, Gordon (*Bedford Coll. London Univ.*), **Temperature trends in England, 1698–1957.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 9(3/4):413–433, **1959.** 3 figs., 27 refs. English, German and French summaries p. 413. **DWB, DLC**—Comparable figures representative of the mean temperature at inland places in central England are provided for every month from 1698 to the end of 1957. These are based on the assemblage of a number of early and scattered records brought to modern standards and to centigrades. Diagrams are added for purposes of illustration and comparison with Holland and elsewhere in Europe. *Subject Headings:* **1. Temperature trends 2. England.**—*Author's summary.*

12.1–320 **551.524.35**(4,5)

Pokrovskaia, T. V., **Anomalii temperatury vozdukha v ianvare na kontinente Evrazii v sviazi s raspredeleniem temperatury na zemnom share.** [Atmospheric temperature anomalies in January over the Eurasian continent related to temperature distribution over the globe.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 65(128):70–82, **1956.** 6 figs., 4 tables, 9 refs. **DLC**—The method of "world weather" is used to study the formation of January temperature anomalies over the northern hemisphere, including North America and the moderate and high latitudes of Eurasia. An examination of temperature anomalies for the period 1890–1939 disclosed a group of negative anomalies, termed monsoonal, and a group of positive anomalies, termed planetary. The relationship of these anomalies to the general circulation was investigated with the aid of the synoptic types established by G. IA. VANGENGEIM. The cartographic analysis was preceded by a statistical treatment of the material. The temperatures for individual years, or groups of years, when January showed negative or positive anomalies in Eurasia, were computed. The monthly means of all the groups of years (for 12 preceding months and for the given January) were determined. The mean monthly differences between the two groups were computed and entered on a map. In January two regions with the maximum deviation from the normal occurring in the USSR are associated with the fact that over Eurasia the characteristics of the thermal regime are seldom homogeneous even in the case of the mean monthly regime. Also the synoptic types are not regularly distributed. Warm zones over the entire continent are associated with zonal and meridional transport. In winter, of the monsoon type, the mean deviation from the normal in the interior of the U.S.S.R. attains −4°C; along the coast it is zero or slightly positive. Differences for the preceding December show a less pronounced deviation from the normal over Eurasia. The anomalies for the various continents and ocean surfaces and for January, December and July, the sequential development of the anomalies from month to month over land and water are described. *Subject Headings:* **1. Temperature anomalies 2. Temperature distribution 3. Europe 4. Asia.**—*I.L.D.*

12.1–321 551.524.36(798)

*De Percin, Fernand and Parmele, Owen S., **Frequencies and durations of hourly temperatures, Fort Greely, Big Delta, Alaska.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Technical Report, EP*-122, Jan. 1960. 20 p. 5 figs., 6 tables, 11 refs. **DWB** (M86 U585t) —This report presents in detail the frequency and duration of hourly temperatures by months, at Fort Greely, Big Delta, Alaska. In winter, temperatures at or below −40°F may be expected only 3% of the time in Dec., 8% in Jan., and 4% in Feb. In these same 3 months, temperatures at or below −25°F can be expected about 12, 17 and 11% of the time, respectively. From Oct. through April, temperatures are at freezing (32°F) or below, from 56% of the time (April) to 99% of the time (Jan.). Temperatures above freezing occur 8% of the time or less from Nov. through March, and only 1% of the time in Jan. In winter, the maximum number of consecutive hours with temperatures at or below −25°F has been 103 hours in Nov., 248 hours in Dec., 162 hours in Jan., and 311 hours in Feb. The average number of consecutive hours per −25°F cold spell for these 4 months are 30, 28, 32, and 28 hours, respectively. In Dec., Jan. and Feb., the average longest period of consecutive days per month with minimum temperatures at or below −25°F is 2, 5, and 5, respectively; at or below −40°F, it is 0, 1, and 2, respectively. In summer, temperatures at or above 68°F occur from May through Sept., but for only a maximum of 17% of the time in the warmest month, July, and a minimum of less than 1% of the time in Sept. In June, July, and Aug., the average longest period of consecutive days with maximum temperatures at or above 68°F is 6, 9, and 5 days, respectively; at or above 50°F, it is 25, more than 30, and 24 days, respectively; and at or above 32°F, it is 30, 31, and 31 days, respectively. *Subject Headings:* **1. Temperature frequencies 2. Minimum temperature frequencies 3. Fort Greely, Alaska.**—*Authors' abstract.*

12.1–322 551.524.36(79) 551.461.2(266)

O'Connor, James F. (*Extended Forecast Sec., U. S. W. B., Wash., D. C.*), **1958: the warmest year of record on the Pacific coast.** *Weatherwise*, Boston, 12(2):52–55; 51, April 1959. 5 figs., table, 3 refs. **DWB**—Daily, monthly and yearly records for high temperatures were broken at many places in the Pacific Coast. Circulation anomalies causing this phenomenon are described and illustrated with mean sea level pressure and anomaly charts. Yearly averages were 2.2° to 4.5°F above normal at Tatoosh, Portland, San Francisco, Los Angeles and San Diego. At San Francisco the yearly average was 5 standard deviations above normal (chance of random occurrence 1 in a million). Water temperatures have been well above normal and fish not seen N of San Diego found in Gulf of Alaska and barracudas off the Washington coast. A remarkable rise in sea level was also noted, suggesting transport of surface waters toward coast to contrast with normal upwelling; net overall, the water temperature was normal for the year. Explanation is strong SW flow in winter and offshore from heated land in summer. *Subject Headings:* **1. Record high temperatures, Pacific States (1958) 2. Pacific States.**—*M.R.*

12.1–323 551.524.36

Saunders, W. E., **Night cooling under clear skies at Wittering.** *Meteorological Magazine*, London, 87(1029):87–90, March 1958. 2 figs., table, 4 refs. **DWB**—The evening changes in cooling rates for Wittering, Exeter, Northolt, and Weston Zoyland are compared by considering the methods by which the cooling rates were derived. The report shows that although there is apparently no evening temperature discontinuity at Wittering, it merely becomes insignificant when compared with some random irregularities which are liable to occur later in the night due to air-mass heterogeneities. The change at Exeter is much more pronounced at grass level than in any screen. *Subject Headings:* **1. Nocturnal cooling 2. England.**—*N.N.*

12.1–324 551.524.36(540)

Srinivasan, T. R. (*Met. Office, Poona*), **A study of the maximum temperature tendency at Poona using the theory of runs.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(1):105–106, Jan. **1959.** 2 tables, eqs. **DWB, DLC**—A report of the utilization of the daily maximum temperature data of Poona Central Agromet. Observatory for the months April and May for the ten years, 1945–54. The theory of runs is applied. *Subject Headings:* **1. Maximum temperatures 2. Poona, India.**—*N.N.*

12.1–325 **551.524.36**(99)

Steĭnberg, V. V., **Samaia nizkaia temperatura na Zemle.** [The lowest temperature on earth.] *Priroda*, Moscow, No. 8:82, Aug. **1958. DLC**—Towards the end of April and beginning of May 1958 the Soviet Antarctica stations: Komsomolskaia, Vostok and Sovetskaia, recorded the lowest air temperatures ever recorded on earth. Vostok in the region of the south magnetic pole reported an air temperature of −78°C on May 3, Sovetskaia −79°C on May 9 and 10 and −81°C on June 26 and 27. These extreme minima were observed not at the winter climax, but at its start. Theoretical calculations utilizing heat balance radiation theory gave a minimum temperature of −80°C (±2°C). Recently a cyclone penetrated into the interior of the continent and produced at Komsomolskaia, 850 km from the coast, wind velocities of 15 m/sec and a snowstorm, and at Sovetskaia (1420 km from Mirny) wind velocities of 20 m/sec. A table giving the lowest observed air temperatures at the stations and dates of occurrence is given. *Subject Headings:* **1. Record low temperatures 2. Cold poles 3. Antarctica.**—*I.L.D.*

12.1–326 **551.524.36**

Warnecke, G. (*Berlin*), **Über die tiefsten in der Atmosphäre gemessenen Temperaturwerte.** [The lowest temperatures on earth.] *Polarforschung*, Kiel, Series 4, 27(1/2):46–47, **1957,** pub. 1959. 5 refs. **DLC**—The author summarizes the data on the lowest recorded atmospheric temperatures. The reported temperature of −76°C recorded in Verkhoiansk in 1838 is regarded as incorrect. The later (1892) recorded temperature of −67.6°C at Verkhoiansk is more correct but the actual cold pole is probably Oimiakon. The lowest temperature for Greenland was measured at Eismitte on March 20, 1930—namely −64.8°C. The lowest temperature for Canada was recorded at Snag, Yukon Territory (Feb. 3, 1947) −61.4°C. Temperatures of −73.6°C and −74.5°C were recorded in Antarctic on May 11, 1957 and on Sept. 17, 1959 respectively; the latter at the South Pole. The Soviet stations in Antarctic recorded a temperature of −83.0°C at Sovetskaia on June 23, 1957. In the free atmosphere a rocket measurement gave a reading of −108°C (165°K) at an altitude of 80 kilometers. *Subject Headings:* **1. Record low temperatures 2. Cold poles 3. Siberia 4. Eismitte, Greenland.**—*I.L.D.*

SOIL TEMPERATURE

See also: **Cave temps.** (Popescu), 12.1–411; **Soil temp. data, Bashkir A.S.S.R.** (Lysak), 12.1–416.

12.1–327 **551.525.4**

Ouellet, C. E., **Etude de la température du sol depuis la surface jusqu'à 8 pieds de profondeur.** [Study of soil temperature from surface to a depth of 8 ft.] *Agriculture*, Montreal, 16(3):77–82, May–June **1959.** 3 figs., 2 tables, 5 refs.—Results of observations of soil témperatures to a depth of 8 ft made at the Anticosti Experimental Farm, since 1954. The annual mean temperature is higher on the ground than in the air. Annual, seasonal, monthly and daily changes in temperature lessen as depth augments. The time during which the ground is frozen diminishes with increasing depth to become nonexistent at about 3 ft. The number of days with a maximum temperature of 40°F is much higher in depth than at the surface. Autumn and winter are less cold beneath the surface than at the surface, but spring and summer are warmer at the surface than below the surface. In the first 3 or 4 ft of the soil, winter is the coldest season and summer the warmest one, but deeper spring becomes the coldest season and autumn the warmest. Soil grows warmer in spring and colder in autumn much slower below than at the surface. *Subject Headings:* **1. Soil temperature 2. Temperature changes with depth 3. Seasonal changes in soil temperature 4. Anticosti Experimental Farm, Canada.**—*A.V.*

12.1–328 551.525.4:551.579.5

†Trénel, M.; Weber, H. and Lindner, H. (*all Inst. Bodenkunde und Pflanzenernährung der Humboldt-Universität Berlin*), **Über die Kondensation des Wasserdampfes im Boden.** [Condensation of water vapor in the soil.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 2, pub. **1958.** p. 517–522. 47 refs. English and French summaries p. 520–521. **DWB** (M(06) I611g)—A brief summary is given on the condensation-process of water in the form of vapor in natural soil. When water recedes in the form of steam into cooler depths of the ground and condenses there, there is a corresponding decrease in temperature differences. There is also a loss of water that takes place by the flowing off of the steam from the underground to the surface. Further details on the steam molecules of atmosphere as they diffuse into the soil and the amount of condensation have been laboratory tested. *Subject Headings:* **1. Soil moisture studies 2. Soil temperature-soil moisture relationships.**—*N.N.*

12.1–329 551.525.6:551.496(52)

Ueji, Torajiro, **Study of the underground temperature gradients of several wells at Arima Spar District, near Kobe, Japan.** *Journal of Geography,* Tokyo, 67(1):31–40, **1958.** 6 figs., 4 tables. In Japanese, English summary p. 31. **DWB**—The underground temperature gradients with reference to the ten wells bored at Arima Spar District near Kobe were studied. Each well bored as deep as 160 m at shallowest and 300 m at deepest from the ground surface respectively. The temperatures were found to be 73°C at lowest and 133°C at highest. Average temperature gradient was found, from calculation, to be 11.7°C per 30 m depth. An isothermal map was made at the depth of 120 m, according to the measuring results of the underground temperature at each point. In consequence, it was found that in the area surrounded by the 50°C isothermal contour there existed places where the temperatures were higher than 50°C so that the author attained the conclusion that temperatures above 50°C will be expected in the area within the 50°C thermal contour at the depth of 120 m. This conclusion will probably be applicable to the whole Arima Spar District as far as the isothermal map concerns. *Subject Headings:* **1. Underground temperatures 2. Well temperatures 3. Arima Spar District, Japan.**—*Author's abstract.*

12.1–330 551.525.4:536.21

van Duin, R. H. A., **De warmtehuishouding van landbouwgronden.** [The heat balance of agricultural soils.] *Landbouwkundig Tijdschrift,* Wageningen, 72(5):146–155, March **1960.** 5 figs., 2 tables, 5 refs. **DA**—General, theoretical and empirical study of the heat balance of agricultural soils, considering especially: 1) the heat capacity and heat conducting power of the soils; 2) distribution of the available heat at the soil surface between air and soil and influence of agricultural and technical treatments of this distribution; 3) reaction of plants on the temperature of the topsoil and of the air layer next to the ground. The effect due to differences in the thermal properties of two soils is found to be dependent on the time of the year and on the depth. Certain treatments have only a little effect on the mean daily temperature, but may cause important deviations in the annual course and influence greatly the diurnal temperature wave. *Subject Headings:* **1. Heat conductivity of soils 2. Air-soil temperature relationships 3. Heat treatment of soils.**—*A.V.*

WATER TEMPERATURE

See: **Sea temp. data** (Haurwitz et al.), 12.1–182; **Sea surface temp. variations** (Ivanova), 12.1–183; **Deep sea temps.** (Ichiye), 12.1–187; **Heat exchange air-water surface** (Nesina), 12.1–209; **Wind effects on sea temp.** (Hanzawa), 12.1–353; **Warming of N. Atlantic** (Bjerknes), 12.1–403.

PRESSURE AND WIND

PRESSURE

See also: **Absolute pressure measurement** (Drawin), 12.1-242; **Trop. pressure variations** (Wollschläger), 12.1–284; **Stratospheric pressure variations** (Haurwitz), 12.1–289; **Pressure distribution in typhoons** (Frank, Jordan), 12.1–301; **Gradient winds** (Slobodov), 12.1–340; **Air parcel motion in a geostrophic wind field** (Kao, Wurtele), 12.1–355; **Geostrophic wind vectors** (Salmela), 12.1–356.

12.1–331 551.**543.1**(492)

Meijer, K. H., **De veranderlijkheid van de luchtdruk in De Bilt.** [Variability of atmospheric air pressure at De Bilt.] *Hemel en Dampkring*, The Hague, 58(2):37-42, Feb. **1960.** 2 figs. **DWB, DLC**—According to C. Braak the most important characteristic of pressure in Holland is its great variation. December shows a variation maximum (45 mb), July a minimum with 25 mb. During the period 1903–1952 the daily maximum and minimum of the pressures have been noted; the difference between the two values gives the diurnal amplitude of the pressure, V24. A fig. gives the mean value of V24 of the meteorological year, month by month. A great difference is stated between January and June. Another fig. shows the number of days with great and small variation of V24. The article ends by showing some considerations on relation between V24 and atmospheric pressure. *Subject Headings:* **1. Diurnal pressure variations 2. De Bilt, Netherlands.**—*A.V.*

12.1–332 551.**543.2**:517.512.2

Troeger, Heinz (*Bremen*), **Die Oberwellen im jährlichen Luftdruckgang und ihre klimatischen Auswirkungen für Mittel-europa.** [The harmonics in the annual pressure wave variation and their climatic analysis for central Europe.] *Meteorologische Rundschau*, Berlin, 12(4):127–128, July/Aug. **1959.** 2 figs., 7 refs. **DWB, DLC**—The quasinodal wave of the annual pressure wave (1 mm) in whose region the amplitudes are close to zero extends from northwest Spain across Normandy, the English Channel, the Netherlands, Schleswig-Holstein-Jutland and South Sweden to Finland. A second quasinodal wave shows also the second wave (2 maxima and 2 minima during the year) over Europe, but with a more west-east orientation from Ireland across central England, Schleswig-Holstein, Poland to East Carpathia. Both quasinodal lever of the first and second waves intersect not far from the Bay of Heligoland; under these circumstances the amplitudes of both these waves are still insignificant in a wide circumference. Therefore existing harmonics in spite of slight amplitude can have an unexpectedly large importance for the weather of an extended neighboring area. Thus the curve of annual pressure variation at Hammers-Hus based on pentad means. Bornholm shows the three maxima in January, May and September and the minima in March/April, July/August and a less distinct one in November as evidence of the presence of a third wave. Since the climate of a locality is dependent more upon the pressure gradient of a rather distant area than upon the atmospheric pressure of the place itself, the author constructed an atmospheric pressure gradient curve for Karlsruhe-Copenhagen (in pentads) which would determine the weather in Central Europe. Since the amplitudes of the third wave show only slight spatial diminutions with this distance from the central region this wave is not considered in the atmospheric pressure gradient. The second wave has an amplitude maximum of 1.3 mm over southwest France and only 0.3 mm over the Danish Isles. The theoretical maxima occur in Jan./Feb. and July/Aug. and the minima in April/May and October/November. In the central European midwinter the gradient is large, hence frequent winter storms; then it diminishes up to May accompanied by fluctuations. Frequently it even attains negative values. In May/June the gradient suddenly becomes huge, above 2.83 mm. At this period occurs the summer "monsoon." The highest gradient occurs occasionally during Aug./Sept. In September the gradient begins to decline so that a quiet "old wives' summer" occurs. *Subject Headings:* **1. Annual pressure variations 2. Harmonic analysis of pressure data 3. Central Europe.**—*I.L.D.*

12.1–333 517.512.2:551.**547.3**:551.510.5

Buriev, V. N., **Sferichen kharmonichen analiz na atmosfernoto naliagane i visochina na atmosferata.** [Spherical harmonic analysis of atmospheric pressure and the height of the atmosphere.] *Khidrologiia i Meteorologiia*, Sofia, No. 2:42–48, **1958.** fig., 10 eqs. Russian and English summaries p. 47–48. **DLC**—The author develops a mathematical theory of the connection between time-averaged atmospheric pressure and geographical coordinates and derives an equation for determining the height of the atmosphere, i.e., $H=3100$ km. *Subject Headings:* **1. Spherical harmonics 2. Harmonic analysis of pressure data 3. Height of the atmosphere.**—*Based on author's abstract.*

WIND AND TURBULENCE

See also: **Turbulence theory** (Taylor), 12.1–1; **Turbulent transfer of heat, Maudheim** (Liljequist), 12.1–26; **Specular and scattered reflections in long range radio wave propagation** (du Castel et al.), 12.1–100; **Over the horizon radio links** (du Castel), 12.1–101; **Turbulent heat transfer in water** (Ivanova), 12.1–183; **Turbulence measurement** (Chepil, Siddoway), 12.1–243; **Turbulence in the boundary layer** (Tarnopol'skiĭ), 12.1–298; **Vertical velocity spectrum near surface** (Panofsky, McCormick), 12.1–345; **Turbulence in the lower layers** (Singer, Raynor), 12.1–346; **Jet stream turbulence** (Kuettner, McLean), 12.1–358.

12.1–334 551.551:551.510.42:697.8

Förchtgott, Jiří, **Turbulence v ovzduší a rozptyl exhalací.** [Atmospheric turbulence and diffusion of effluents.] *Meteorologické Zpravy*, Prague, 12(5):107–110, **1959.** 6 figs., table, 6 refs. Czech, Russian, English and German summaries p. 108. **DWB, DLC** The extreme effects of convection and mechanical turbulence (lee waves) in the free atmosphere are compared and the importance of the turbulence for some science branches is mentioned. More detailed is the discussion on the meteorological conditions affecting typically the dispersion of smoke plumes. Three extreme possibilities are represented by the convection, the wave streaming in the space considered and the well expressed ground inversion during calm high pressure situations. *Subject Headings:* **1. Atmospheric turbulence 2. Diffusion of gases 3. Smoke plume meteorology.**—*Author's abstract.*

12.1–335 551.551:551.510.42:535:519.27

Soo, S. L.; Tien, C. L. and Kadambi, V. (*all, Dept. of Mechan. Engin., Princeton Univ.*), **Determination of a turbulence characteristics of solid particles in a two-phase stream by optical autocorrelation.** *Review of Scientific Instruments*, N. Y., 30(9):821–824, Sept. **1959.** 7 figs., table, 7 refs., 5 eqs. **DWB, DLC**—Application of optical autocorrelation techniques enables determination of Lagrangian correlation, scale, and intensity of turbulent motion of solid particles in a two-phase stream. This method allows measurement of both longitudinal and transverse correlations. *Subject Heading:* **1. Turbulence correlation functions.**—*Authors' abstract.*

12.1–336 551.551.21:551.554:551.43

Ayer, Harold S. (*U. S. W. B., Portland, Oregon*), **The wind profile at the crest of a large ridge.** *Monthly Weather Review*, Wash., D. C., 19–23, Jan. **1960.** 8 figs., 6 refs. **DWB, DLC**—A set of observations of hourly wind movement at four levels in the layer 2–14 m above the crest of a ridge is presented. The data are classified into prevailing wind types. During most periods the profile conforms to observations in flat terrain only in its lower part, and it does not conform to a normal structure of the free air. It is suggested that the observed profile represents an incompletely developed turbulent profile due to a short fetch over the ground surface. *Subject Headings:* **1. Orographic effects on wind 2. Micrometeorological wind profiles 3. Low level turbulence.**—*Author's abstract.*

12.1–337 551.551.5:551.588.2:551.515.8

Turner, H. S., **The geographical distribution of clear-air turbulence.** *Meteorological Magazine*, London, 88(1040):33–38, Feb. **1959.** 3 figs., 2 tables, 5 refs. **DWB, DLC**—Purpose of this experiment was to investigate the existence of any relation between topography and clear-air turbulence. The results of frequency, degree of severity, and position of clear-air turbulence at 12,000–30,000 flight altitudes over smooth surfaces (i.e., sea) and different land surfaces as recorded by a number of cooperating British pilots in 1956 are mapped and presented in graphs, and tables. The total clear-air distance flown was 185,760 naut mi and shows four-times and two-times higher frequency over coast and land respectively, than over sea. Seasonal distribution and the relation to cold and warm fronts are given. Turbulence, if connected to topography, may be related to standing waves. *Subject Headings:* **1. Topographic effects on clear-air turbulence 2. Clear-air turbulence.**—*W.N.*

12.1–338 **551.551.8**:551.510.42

Iudin, M. I. (*Main Geophysical Obs., Leningrad*), **Physical considerations on heavy-particle diffusion.** *Advances in Geophysics*, N. Y., Vol. 6, pub. **1959.** p. 185–191. 3 figs., 14 refs., 14 eqs. **DWB, DLC**—The aspects of heavy-particle diffusion which makes this process different from the more commonly investigated diffusion of particles suspended in the atmosphere have been considered in this paper. The essential attention is paid to the problem of dispersion intensity varying because of the lack of coincidence between the velocities of heavy particles and those of the surrounding air. The upper and lower limits for the changes of the coefficient of diffusion due to the particle's own velocity of fall have been shown, and the asymptotic law stated earlier by the author has been corroborated. *Subject Headings:* **1. Diffusion coefficient 2. Diffusion of heavy particles.**—*Author's abstract.*

WIND DISTRIBUTION AND VARIATION

See also: **Transosonde diurnal winds, N. Pacific** (Angell), 12.1–234; **Surface wind-visibility relationships** (Inglis), 12.1–422.

12.1–339 551.552:**551.524.2**:551.510.528

Chen, Shou-jun (*Dept. of Physics, Peking Univ.*), **The mean wind and temperature field along 140°E meridian.** *Acta Meteorologica Sinica*, Peking, 30(1):92–98, Feb. **1959.** 7 figs., 2 tables, 10 refs. In Chinese; English summary p. 98. **DLC**—Mean meridional cross-sections along 140°E for January, April, July, and October are constructed. The westerly component of the mean geostrophic flow, the distribution of the mean temperature and mean tropopause are discussed. The result is compared with the cross-section along 80°W. *Subject Headings:* **1. Meridional cross sections 2. Tropopause profiles.**—*Author's summary.*

12.1–340 551.552:**551.542.1**:001.4

Slobodov, B. Ia., **K voprosu ob opredelenii gradientnogo vetra.** [The problem of determining the gradient wind.] *Meteorologiia i Gidrologiia*, Leningrad, No. 11:27–28, **1958.** 12 refs. **DWB, DLC**—The author classifies the various methods for defining gradient winds into strict, insufficiently strict and incorrect, and methods belonging to each group, employed by various Soviet meteorologists; all of them are discussed. The strict definition is that which considers it as directed along an isobar; together with the fundamental equation of atmospheric motion it is possible to establish all the properties of the gradient wind (N. E. Kochin, D. L. Laikhtman, M. I. Iudin, etc.). The definition of the gradient wind as given by S. P. Khromov is strict but it is not based upon the empirically established fact of motion along an isobar, instead it is a consequence of motion along an isobar (uniform and horizontal motion). The gradient wind definition of A. Kh. Khrgian, M. S. Averkiev, etc. are not strict enough. According to Khrgian the definition of geostrophic wind is a "straight uniform air motion under the influence of the coriolis force and horizontal pressure in the absence of friction." Averkiev identifies the concept of stable motion with that of inertial motion. The incorrect definition is that of K. T. Logvinov, namely; "a gradient wind is a wind which results from the nonuniform distribution of pressure without the participation of friction." *Subject Heading:* **1. Gradient winds.**—*I.L.D.*

12.1–341 **551.553.1**:551.437(282.271)

Staley, D. O. (*Univ. of Wisconsin*), **Some observations of surface-wind oscillations in a heated basin.** *Journal of Meteorology*, Boston, 16(4):364–370, Aug. **1959.** 6 figs., table, 9 refs. **DWB, DLC**—Hodographs of resultant surface winds are presented for each hour of the day for July and August at stations in the Columbia Basin of eastern Washington and Oregon.

Marked diurnal wind variations occur at all stations, and most are related to local topography. The end point of the resultant wind vector usually turns clockwise, although at some stations it shows a tendency to turn counterclockwise during part of the day. Departures of resultant winds at individual hours from the average of all 24 resultant winds at the station show flow out of the basin during the day and inflow at night. A phase difference occurs between the western and eastern slopes of the basin. This difference appears related to inland progression from western Washington of a large-scale sea-breeze circulation. *Subject Headings:* **1. Surface wind variations 2. Diurnal wind variations 3. Columbia River Basin.** -*Author's abstract.*

12.1–342 551.**553.21**:551.515.12:551.557.2(54)

Mulky, G. R. and Banerji, A. K. (*both, Regional Met. Center, Nagpur, India*), **The mean upper-wind circulation around monsoon depressions in India.** *Journal of Meteorology*, Boston, 17(1):8–14, Feb. **1960.** 14 figs., table, 2 refs. **DWB, DLC**—All available rawin observations taken within 400 miles from the centers of monsoon depressions in the Indian area have been used to obtain a picture of the average upper-wind circulation around the depressions. Cyclonic circulation is found to persist in southwestern sector up to a height of 9 km, while in the other sectors it disappears at lower levels. Rainfall patterns associated with the depressions have been compared with the circulation in the upper levels. The inflow and outflow of air from the system have been assessed. The application of the concept of "steering" has been examined. *Subject Headings:* **1. Upper air wind analysis 2. Indian monsoon 3. Cyclone circulation 4. India.**—*Author's abstract.*

12.1–343 551.**553.21**:551.557.5:551.513.2

Reiter, Elmar R., **Das Ende des indischen Sommermonsuns 1954 mit Daten der österreichischen Cho-Oyu-Expedition.** [End of Indian summer monsoon in 1954 with observational data of the Austrian Cho-Oyu-Expedition.] *Germany. Deutscher Wetterdienst, Berichte*, 8(54):293–297, **1959.** 6 figs., 9 refs. German and English summaries, p. 293. **DWB**—Using time-sections of Indian rawinsonde stations, it can be shown that the retreat of the Indian summer monsoon is associated with a shift of the jet stream toward the south of the Himalayas. The change in the circulation system obviously is brought about by a single jet-maximum, as can be demonstrated with the aid of upper flow charts. Thus, the "burst" as well as the retreat of the monsoon are linked with the flow pattern at the jet-stream level. The shift of the mean position of the upper-air trough from summer to winter is forced by the configuration of the Central Asiatic plateau. The upper-air stream lines over the eastern Himalayas are in agreement with cloud-drift observations made by the Austrian Cho-Oyu-Expedition in 1954. *Subject Headings:* **1. Indian monsoon 2. Jet stream maxima 3. Upper air flow patterns 4. India.**—*Author's abstract.*

12.1–344 551.**553.5**(436)

Reiter, Elmar R. (*Met. and Geoph. Inst., Innsbruck U.*), **Maximale Böigkeitsverhältnisse in Innsbruck.** [Maximum gustiness conditions at Innsbruck.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 9(3/4):327–339, **1959.** 5 figs., 4 tables, 5 refs. German, English and French summaries p. 327. **DWB, DLC**—Frequency distributions after speed and time of occurrence of the daily maximum gusts are discussed separately for days with foehn or thunderstorm and for days without föhn or thunderstorm. A comparison is made between the annual variation of daily and monthly maximum gusts and that of the maximum hourly run of the wind. *Subject Headings:* **1. Gustiness 2. Diurnal gustiness variations 3. Innsbruck, Austria.**—*Author's summary.*

VERTICAL DISTRIBUTION

See also: **Vertical wind distribution** (Tarnopol'skiĭ), 12.1–298; **Wind profiles at crest of ridge** (Ayer), 12.1–336.

12.1–345 551.**554**:551.551.2:629.13

Panofsky, H. A. (*Penna. State Univ.*) and McCormick, R. A. (*U. S. Weather Bureau*), **The spectrum of vertical velocity near the surface.** *Royal Meteorological Society, Quarterly*

Journal, 86(370):496 503, Oct. **1960.** 9 figs., table, 19 refs., 13 eqs. **DLC, DWB.** Also issued as *Institute of the Aeronautical Sciences, IAS Report*, No. 56-6, 1959. 12 p. (Photo-offset of manuscript) table, 6 refs., 12 eqs. **DWB** (M(055) 159re) -Observations of a considerable number of vertical-velocity spectra are combined to show that under near-neutral and unstable conditions, the shape of the spectrum is essentially invariant up to heights of order 100 m, and the 'scale' of turbulence is proportional to height within the régime. A semi-empirical working hypothesis is suggested which relates the spectrum to wind speed, lapse rate, height and roughness. *Subject Headings:* **1. Vertical wind velocity spectrum.** *Authors' abstract.*

12.1–346 551.554:551.551.25:533.6.07

Singer, Irving A. and Raynor, Gilbert S., **Study of the wind profile in the lowest 400 feet of the atmosphere.** U. S. Brookhaven National Lab., Upton, N. Y., Contract R-65-8-99812-Sc-04-91, Progress Report No. 3, Jan. 15–June 15, 1959, issued July **1959.** 6 p. 9 figs. (incl. photos) (*U. S. Brookhaven National Laboratory, BNL* 557(T-148)). **DWB** (M(051) U582bro) —The construction and operating characteristics of the Brookhaven wind tunnel are described, and its use in Aerovane calibration is reported. The Aerovanes calibrated for use in this project were found to be well matched. The automatic data processing system and the analysis of a sample run are described, and the spectra obtained from this analysis are presented. Equipment is illustrated. *Subject Headings:* **1. Aerovanes 2. Wind profiles 2. Wind tunnel experiments.**—*Authors' abstract.*

12.1–347 551.555.9:551.588.2(234.42)

Milosavljević, Marko, **Einfluss der Transsylvaner Alpen auf die Struktur des östlichen Windes in der Pannonischen Ebene.** [Influence of the Transylvanian Alps on the structure of the east wind in the Pannonian Plain.] *Germany. Deutscher Wetterdienst, Berichte*, 8(54):236–240, **1959.** 5 figs., 2 tables, 5 refs. German, English and French summaries p. 236. **DWB, DLC**—This study analyzes the influence of Transylvanian Alps on the formation of the strong, gusty wind in the Pannonian Plain, which is known under the name "koshava." The distribution of the air pressure during the blowing of the koshava wind is as follows: anticyclone over Ukraine and Romania and depression over Adriatic Sea. They become smaller over Yugoslavia toward the west going from the mountain region and even more quickly in the east over the Valachian Plain. *Subject Headings:* **1. Kosava wind 2. Orographic effects on wind 3. Pannonian Plain.**—*Author's abstract.*

WIND EFFECTS

See also: **Wind utilization** (Fraysse), 12.1 48; **Wind utilization,** 12.1 49; **Shelter belt effects** (Lavrov), 12.1–61; **Windbreak effectiveness** (Lorch), 12.1–62; **Shelter belt effects** (Marion), 12.1–63; **House under simulated wind and snow loads** (Dorey, Schriever), 12.1–89; **Air movement around buildings** (Weston), 12.1–90; **Mont Blanc funicular and meteorology,** 12.1–91; **Wind forces on structures** (Singell), 12.1–93; **Wind effects on sea level** (Banal), 12.1–176; **Wind wave theories** (Brovikov), 12.1–177; **Wind wave computation** (Krylov), 12.1–179; **Wind stress on water** (Reid), 12.1–180; **Wind driven ocean circulation** (Ichiye), 12.1–184; **Wind stress energy distribution in ocean** (Veronis), 12.1 -185; **Wind effects on ocean currents, San Diego** (Gaul, Stewart), **12.1–186.**

12.1–348 551.556.6:551.554:69

Savitskiĭ, G. A., **Vetrovaia nagruzka na inzhenernye sooruzheniia.** [Wind load on engineering structures.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:30–32, May **1959.** **DWB, DLC**—The cause of oscillation of buildings lies in their construction during which they become aerodynamically unstable and not in the nature of the wind to which is attributed the characteristics of regular disturbing force. For computing engineering structures the following wind parameters are needed, viz: 1) magnitude of the maximum computable wind speed pressure or velocity near the surface of the earth, 2) the law of distribution of wind with height and 3) the law of distribution of wind velocity along the horizontal at the surface of the earth and at vamping heights. In actual instances wind pressure data will be different from the "accepted" standards and will have to be measured specifically at the given localities. The law of distribution of wind velocity along the horizontal is especially important for computing transmission lines, suspension bridges, also the frequency of wind velocity is important. Dynamic coefficients of wind load on various steel structures as recommended in the U.S.S.R. are given and the need for a program of observations on wind load, taking into account microclimatic conditions such as microrelief, is discussed. *Subject Headings:* **1. Wind load on structures 2. Building resistance.**—*I.L.D.*

12.1–349 551.556.6:69

Sherlock, Robert H., **Wind forces on structures: nature of the wind.** *American Society of Civil Engineers. Structural Div., Journal,* Vol. 84, Paper, 1708, July **1958.** 16 p. 4 figs., tables, 8 refs. **DWB**—A report summarizing the investigations on the factors which determine wind force, the structural failures caused by wind force, and the history of the investigations. *Subject Heading:* **1. Wind load on structures.**—*N.N.*

12.1–350 551.556.6:69

Woodruff, Glenn B. and Kozak, John J., **Wind forces on structures: fundamental considerations.** *American Society of Civil Engineers. Structural Div., Journal,* Vol. 84, Paper 1709, July **1958.** 13 p. 6 figs., 7 refs., eqs. **DWB** (P)—This report by the ASCE Committee on Wind Forces discusses the origin of strong winds, the general characteristics of the atmosphere, the extra-tropical cyclones, hurricanes and tornadoes. Recommendations are made for recording the wind velocity at a height of 30 ft which is the basic velocity of reference in different height zones. *Subject Heading:* **1. Wind load on structures.**—*N.N.*

12.1–351 551.556.8:551.515.1:551.461.2(729.86)

Donn, William L. and McGuinness, William T. (*both, Lamont Geological Obs., Columbia Univ.*), **Barbados storm swell.** *Journal of Geophysical Research,* Wash., D. C., 64(12):2341-2349, Dec. **1959.** 10 figs., ref. **DLC**—Severe and damaging surf often strikes Barbados and other islands of the Lesser Antilles. Owing to the broad reef shelf, the nature of this surf has not been well understood. Wave and tide recorders maintained in Barbados during IGY have furnished useful data for the explanation of this phenomenon. The strong swell responsible for the coastal surge has been related to intense extratropical cyclones in the North Atlantic Ocean through use of wave travel times based on the group velocity appropriate to the period of the observed swell. A procedure for future forecasts is suggested. *Subject Headings:* **1. Storm surges 2. Surf 3. Wind effects on water surfaces 4. Barbados, Lesser Antilles.**—*Authors' abstract.*

12.1–352 551.556.8:551.465:551.468

Fedorov, K. N., **Pribrezhnye vetrovye techeniia i teoriia Ekmana.** [Coastal wind currents and Ekman theory.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.,* No. 8:1238–1241, Aug. **1959.** 3 figs., 6 refs., 4 eqs. **DWB, DLC**—Basic consideration of the Ekman theory are reviewed in connection with P. N. IVANOV's comments (refs.) on angular deviations of the coastal wind currents from main direction of wind, due to curvature and height of the coastal lines and depth of sea. Actual data on deviations, observed in the Black, Baltic and Caspian Seas, are plotted on graphs. General analytical expressions are developed by the author for determining the direction of the coastal current from the wind direction and depth of sea. The final equation with graphs and tables can serve for computation of the current direction for coastal lines of not very complicated configuration. *Subject Headings:* **1. Coastal currents 2. Ekman theory 3. Wind driven currents.**—*N.P.S.*

12.1–353 551.556.8:551.465:551.526.6

Hanzawa, Masao (*Japan. Met. Agency*), **Studies on the inter-relationship between the sea and the atmosphere. Pt. 4.** *Oceanographical Magazine,* Tokyo, 10(2):215–226, Dec. **1958.** 3 figs., table, 18 refs., eqs. **DWB, DLC**—Through the course of 1955, the sea surface temperatures along the western coasts of both North and South America were anomalously low with strong persistency, while, on the other hand, those of eastern Asia namely along the Pacific side of Japan and the Philippine Islands were rather high. These anomalous oceanic conditions can be explained from the standpoint of the drift current theory. Transport of water due to winds over the North Pacific Ocean, covering the area of 25°N–55°N; 130°E–120°W, was calculated with 10° lat.-long. intervals, after MONTGOMERY's manner. Anomalies of this transport from the average conditions show that in 1955 the transport was above normal in the regions of the Gulf of Alaska and the southeastern part of the North Pacific. It is concluded that this above normal transport, due to the prevalence of the so-called Pacific High, brought about the anomalous surface temperatures along both boundaries of the North Pacific. *Subject Headings:* **1. Ocean-atmosphere interaction 2. Drift currents 3. Wind effects on sea temperature.**—*Author's abstract.*

UPPER AIR WINDS

See also: **Upper air wind variations** (Price), 12.1–141; **Ionos. wind measurement** (Pütter), 12.1–144; **Synoptic studies of jet stream** (Defant), 12.1–252; **Upper air wind forecasting** (McRae, Phillpot), 12.1–253; **Jet stream effect on cyclogenesis** (Defant), 12.1–295; **Westward intensification of polar front jet stream** (Defant), 12.1–296; **Upper air wind analysis** (Mulky, Banerji), 12.1–342; **Jet stream maxima** (Reiter), 12.1–343.

12.1–354 551.557:551.542.1:551.510.721:662.2:539.1

Drogaĭtsev, D. A., **Puti vozmozhnogo rasprostraneniia produktov atomnogo raspada s Marshallovykh ostrovov.** [The paths of possible spread of atomic decay products from the Marshall Islands.] *Priroda*, Moscow, No. 7:78–80, July **1958.** fig. **DLC**—The atmospheric transport of atomic dust from explosions conducted on the Marshall Islands is discussed in the light of the trajectories of the geostrophic wind which are determined by the winter anticyclone and the summer low pressure over Asia. In winter geostrophic winds on the tropics of the Asian area of the Northern Hemisphere flow westward and south-westward crossing the equator. Hence air particles from the Marshall Islands are spread in winter over the Philippines and Indonesia and farther to the Indian Ocean, Africa and Australia. In the summer trajectories of air particles from the Marshall Islands to Taiwan bulge to the southwest. Over the area from the Marshall Islands to Taiwan the pervading direction in summer as well as in winter is east-south-east; but at Taiwan the particles enter the south-west-south wind zone and turn northeast to Kamchatka and the Bering Sea. A map showing the normal monthly trajectory of atmospheric particles from the Marshall Islands is presented and the trajectories for each month and the paths of atomic dust from explosives in the Marshall Islands are discussed. *Subject Headings:* **1. Transport of radioactive debris 2. Geostrophic winds 3. Radioactivity in the atmosphere.**—*I.L.D.*

12.1–355 551.557:551.542.1 551.511.3:551.515.8

Kao, S.-K. and Wurtele, M. G. (*both, Dept. of Met., Univ. Calif., Los Angeles*), **The motion of a parcel in a constant geostrophic wind field of parabolic profile.** *Journal of Geophysical Research*, Wash., D. C., 64(7):765–777, July **1959.** 13 figs., 2 tables, 13 refs., 30 eqs. **DLC**—A geostrophic wind field is assumed, constant in time, with a jet-profile in the form of a parabola. From an arbitrary latitude a parcel is given an arbitrary finite perturbation from its equilibrium velocity, and the resulting motion of the parcel is studied. Two methods are used: that of classical dynamics, and the modern phase-plane analysis for nonlinear systems; and the generality of the latter method in hydrodynamics is emphasized. For a middle-latitude perturbation a precise nonlinear condition of instability is formulated, and the meteorologically significant oscillations are examined in detail. Low-latitude perturbations, in which the Coriolis parameter varies linearly with latitude, are also discussed. Sample trajectories are exhibited for the different types of oscillations. *Subject Headings:* **1. Air parcel trajectories 2. Atmospheric circulation theories 3. Geostrophic wind field.**—*Authors' abstract.*

12.1–356 551.557:551.542.1

Salmela, Henry A., **Accuracy of mean monthly geostrophic wind vectors as a function of station network density.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 112, June **1959.** 31 p. 16 figs., 5 tables, 3 refs. **DWB, DLC**—Two experiments, aimed at studying the accuracy of analyses of mean monthly contour charts at three levels, with five different densities of station network coverage in one experiment and four in the other, are described. The results of the experiments show that when geostrophic winds computed from mean monthly upper-air contour charts based on sparse data coverage are compared to those derived over areas of optimum coverage a quantitative measure of the relative accuracy is obtained. *Subject Headings:* **1. Geostrophic wind validity studies 2. Wind vector computations.**—*Author's abstract.*

12.1–357 551.**557.36**(439.1)

Bucsy, József, **Vorkommenshäufigkeit der sehr starken Winde nach Höhe und Richtung über Budapest.** [Frequency of very strong winds over Budapest according to altitude and direction.] *Időjárás*, Budapest, 63(5):266–273, Sept./Oct. **1959.** 4 figs., 3 tables, 4 refs. Russian summary p. 266; Hungarian summary p. 272–273. **DLC**—The study evaluates winds of 30 m/sec velocity and more, during a twenty-five year period (1931–1955) over Budapest. Tables and diagrams are attached. It was observed that the mean value of very strong winds in winter is above 500 m and in summer above 2000 m. The strong winds over Budapest in the upper layer of the troposphere are influenced in winter by air currents from the north, and in summer by oceanic air currents. *Subject Headings:* **1. Wind velocity distribution 2. Strong wind frequencies 3. Budapest, Hungary.**—*E.K.*

12.1–358 551.**557.5**:551.**551.5**:629.135.15

Kuettner, Joachim and McLean, George, **Vertical motions in the jetstream.** *Schweizer Aero-Revue*, Zurich, 35(4):255–259, April **1960.** 9 figs., 3 refs. **DLC**—The evidence is increasing to show that possibility exists for the utilization of jet-stream over flat grounds for flights. The article attempts to lay some groundwork for practical approach. The characteristics of jetstream are described and illustrated. The un-balance and dynamic instability in the jetstream along with the vertical motions in jetstream are considered. Flight measurements suggest that bands of weak vertical motions, 50 to 100 Km wide, paralleled the jetstream core on its right side over most of its length and may suffice to support a sailplane of very high performance. In cyclonically curved jetstreams, strong and turbulent vertical motions occur at locations where the trough line intersects a zone of strong horizontal wind shear. If the problem of injecting sailplane at the proper altitude and position can be solved, flights over very long distances could be attempted. *Subject Headings:* **1. Jet stream 2. Jet stream turbulence 3. Jet stream sailplane flying.**—*A.V.*

12.1–359 551.**510.53**:551.**557.2**

Pogosian, Kh. P., **Stratosfernoe struĭnoe techenie v teploe polugodie.** [Stratospheric jet stream in the summer half-year.] *Meteorologiia i Gidrologiia*, Leningrad, No. 7:3-13, July **1959.** 5 figs., 2 tables, 13 refs. **DWB, DLC.** Transl. into English issued by U. S. Joint Publications Research Service, N. Y., as its JPRS L-1144-N, Dec. 21, **1959.** Price: $0.50 from Office of Technical Services, Wash., D. C. **DWB** (M57.2 P646str)—The results of studies of the stratospheric jet stream in winter were discussed by the author in *Met. i Gid.*, No. 2, **1959** (*see* 11.6–270, June 1960, *Met. Abstracts*). There was also shown distribution of temperature during transition periods (Sept. and March). In the present article the author discusses variations in intensities and inter-seasonal movements of the stratospheric jet stream in relation to specific circulation in extra tropical latitudes during three different periods (1956, 57 and 59), illustrated in three graphs (Fig. 1–3). Substratospheric jet stream above Caucasus and extratropical stream above Novaya Zemlya are analyzed with average vertical sections of atmosphere for Julies of these years, shown on fig. A. Variations in average monthly temperatures and average monthly maximum velocity distribution during different months are discussed in reference to tabulated results (Table 1, 2) and graphs (Fig. 5). The cause of formation of ozone in the atmosphere and its significance in heat balance in atmosphere are outlined in relation to its concentration, varying with latitude and vertical movements of air. Nonperiodical variation in the ozone concentration is connected with the temperature changes in lower atmosphere. Considerable warming up of air was observed in January 1958 in the Central Arctic at altitudes of 15–30 km during polar night. Opinions of different investigators on the causes of this phenomenon are reviewed. Detailed study of the inter-seasonal changes in intensity and position of stratospheric jet streams will be possible only after large number of high quality synchronic observations. *Subject Headings:* **1. Air movements in stratosphere 2. Atmospheric temperature 3. Wind distribution.**—*N.P.S.*

VERTICAL MOTION

See also: **Lee wave flights** (Alt), 12.1–47; **Lee wave flights** (Fraysse), 12.1–48; **Gliding,** 12.1–49; **Vertical motion-precip. relationships** (Izawa), 12.1–257; **Convective motion** (Förchtgott), 12.1–382; **Cloud vortices** (Levine), 12.1–383.

12.1–360 551.558:551.511.6:551.524.4

Robinson, G. D. (*Met. Office, London*), **Vertical motion and the transfer of heat and momentum near the ground.** *Advances in Geophysics*, N. Y., Vol. 6, pub. **1959.** p. 259–268. 4 figs., 2 tables, 3 refs., eqs. **DWB, DLC**—Results of measurement on two occasions of vertical (w) and horizontal (u) wind components and temperature (θ) at about 1 m above short grass are presented. The sampling intervals are $\frac{1}{4}$ sec. and $\frac{1}{30}$ sec., respectively. The Richardson number is small and negative in both cases. The spectrum of w and co-spectra of w and u and w and θ are derived. These indicate that the motions connected with heat transfer are of lower frequency than those concerned in the momentum flux. Some confirmation is obtained from the amplitude distribution of w. Comparison of the spectrum of w with the two co-spectra demonstrates the transfer of energy between the different scales of w. *Subject Headings:* **1. Vertical motion 2. Heat transfer 3. Momentum-heat diffusion relationships 4. Turbulent transfer.**—*Author's abstract.*

12.1–361 551.558.1:551.511:537.312

Nakagawa, Yoshinari (*Univ. Chicago, Ill.*), **Heat transport by convection in presence of an impressed magnetic field.** *Physics of Fluids*, N. Y., 3(1):87–93, Jan./Feb. **1960.** 3 figs., 2 tables, 8 foot-refs., 67 eqs. **DWB**—The effect of an impressed magnetic field on heat transport by convection, which arises from instability in a layer of an electrically conducting fluid, bound between two constant temperature surfaces, is examined. It is shown that such a field reduces the amount of heat transported by convection, and that when the strength of the magnetic field is increased, such reduction becomes proportional to $(\pi^2 Q)^{-1}$, where $Q=\sigma\mu^2 \cos^2 \vartheta H^2 d^2/\rho v$, d is the depth of the layer, ρ the density, H the strength of magnetic field, ϑ the inclination of the direction of H to the vertical, and σ, μ and v are the coefficients of electrical conductivity, magnetic permeability, and kinematic viscosity, respectively, for all types of the boundary conditions. It is also shown that in the neighborhood of the marginal state of stability, a simple formula characterizes the heat transport by convection. *Subject Headings:* **1. Convective heat transfer 2. Magnetic field effects on convection.**—*Author's abstract.*

12.1–362 551.558.1:551.515:551.524.4

Tippelskirch, H. V., **New experiments on convection: The formation of ring cells.** *Schweizer Aero-Revue*, Zurich, 35(4):253–254, April **1960.** photos, ref. **DLC**—Investigation carried out for the Flugmeteorologischer Institut der Deutschen Forschungsanstalt für Segelflug. It is concerned with the experimental demonstration of a convectional motion, hitherto not investigated. Important feature of this motion is its appearance, when local instability acts together with instability extended over an area in a fluid layer covering the plane. A fluid layer with vertical temperature gradient has been considered; a system of concentric annular cells around the point of instability at the lower boundary was situated. Further observations show that the annular cells represent a special case of a convection current system noted as "toroid cells" introduced by ZIEREP. Magnitude of vertical temperature gradient determines number of cells and speed formation. It could be shown that 1) the geometric form of the toroid cells is determined by the form of the local instability area, that is by the geometric configuration of the heat source activating the instability; 2) the flow in the toroid cells has the properties assumed by ZIEREP; 3) with less than critical stratification according to RAYLEIGH the horizontal temperature gradient determines the onset of the toroid flow. *Subject Headings:* **1. Convective currents 2. Thermal convective currents 3. Vertical temperature gradient 4. Convective cells 5. Toroid cells.**—*A.V.*

12.1–363 551.558.21:551.43

Foldvik, Arne and Palm, Enok, **On two-dimensional mountain waves with special emphasis on longer waves.** *Norske Videnskaps-Akademi i Oslo. Institutt for Vaer- og Klimaforskning, Publications and Reports*, No. 4, 1957/1958, issued **1958.** 9 p. 4 figs., 6 refs., eqs. **DWB** (M(055) N863p)—In the otherwise good agreement between observations and theory on mountain waves, a discrepancy exists when dealing with longer waves (>20 km). Hence the hypothesis expressed here that the waves exist in a two-dimensional model, seems to be better than that used in other atmospheric models. The model demonstrated and discussed shows a wave length of 42 km at the 20 km level. *Subject Headings:* **1. Mountain waves 2. Long waves.**—*W.N.*

12.1–364 551.558.21:551.43

Larsson, L., **A method to study the structure of standing lee waves and rotors.** *Schweizer Aero-Revue*, Zurich, 35(5):327–331, May **1960.** 5 figs., 4 refs. **DLC**—This study describes a method of measuring the temperature and humidity field in lee wave and rotor areas using an aircraft equipped with electrical resistance thermometers. Potential temperature lines, streamlines, can be drawn in the laminar air flow whereby areas with smooth air flow can be effectively distinguished from areas with turbulent air. The analysis of the actual rotor case shows that a rotor cloud and the air below form a turbulent vortex with a horizontal axis parallel to the mountain. The transition zone between smooth and turbulent air is very narrow, and turbulence appears to be most violent in this zone. *Subject Headings:* **1. Lee waves 2. Rotors 3. Air flow over mountains.**—*A.V.*

12.1–365 551.558.21:551.43(458.2)

Pilsbury, R. K., **Orographic waves over Malta.** *Meteorological Magazine*, London, 88(1039):17–20, Jan. **1959.** 4 figs., ref. **DWB, DLC**—A preliminary note on the phenomenon observed March 15, 1958. An analysis of Orendi radiosonde ascents is in process, but the few samples described here give evidence of waves at 11,000 ft, 29,000 ft and 38,000 ft. *Subject Headings:* **1. Orographic waves 2. Malta.**—*W.N.*

AQUEOUS VAPOR AND HYDROMETEORS

HUMIDITY

See also: **Humidity measurement** (Wood), **12.1–245.**

12.1–366 **551.571.3**(73)

Reitan, Clayton H. (*Univ. of Arizona*), **Distribution of precipitable water vapor over the continental United States.** *American Meteorological Society, Bulletin*, 41(2):79–87, Feb. **1960.** 16 figs., 3 tables, 3 refs. **DWB**—Mean monthly values of precipitable water for about 50 stations in the United States are used to describe the amount and variation of moisture over the area. The average precipitable water over the U. S. is found to be 1.75 cm and to range from 0.94 cm in February to 2.99 cm in July. Monthly and yearly averages for the period 1946 to 1956 indicate that there is considerable variation on a monthly and sectional basis but that the yearly and overall area amounts of precipitable water are rather stable. *Subject Headings:* **1. Moisture distribution 2. Precipitable water data 3. United States.**—*Author's abstract.*

12.1–367 **551.571.4:551.575.1**

Szepesi, Dezső, **A specifikus nedvesség függőleges elsoszlásának változása kisugárzási ködhelyzetekben.** [Variation of the vertical distribution of specific humidity in radiation-fog situations.] *Időjárás*, Budapest, 62(3):139–143, May/June **1958.** 5 figs., ref. Hungarian and English summaries p. 139. **DLC**—Vertical distribution of specific humidity is one of the important factors influencing the variations of dew-point from night till morning, and its variations during the night are analysed. It is proved that the change of the distribution of specific humidity from 15^h till 03^h GMT is determined by the altitude of the temperature-inversion in the afternoon and the mean wind velocity during the night. *Subject Headings:* **1. Vertical humidity distribution 2. Radiation fog 3. Dew point variations.**—*Author's abstract.*

12.1–368 **551.571.7**

*Peixoto, José P., **Hemispheric humidity conditions during the year 1950.** Massachusetts Institute of Technology. Dept. of Meteorology, Contract AF 19(604)-2242, Scientific Report No. 3, Oct. **1958.** 142 p. 117 plates (maps), 10 tables, 9 refs., eqs. **DWB**—Water in its vaporous phase alone is treated here and its flow is based entirely on direct wind observations rather than geostrophic. The study was conducted by the General Circulation Project at M.I.T. and resulted in a set of Northern Hemisphere charts featuring distribution of yearly and seasonal values of the standard deviations from specific humidity at the 500, 700, 850 and 1,000 mb pressure levels. They are based upon the recordings of 90 aerological stations (including ships) as featured in the U. S. Weather Bureau's "Daily Hemisphere Maps." Any moisture characteristics desired, and also limited regional averages for comparison with hydrologic and/or oceanographic measurements, are possible by means of these charts. The tables contain zonal averaged values of the mean specific humidity and precipitable water. Further, summary of the main characteristics of the meridional flux of water vapor integrated zonally and characteristics of the mean meridional eddy flux, are added. *Subject Headings:* **1. Upper air humidity 2. Northern Hemisphere charts.**—*W.N.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: **Evaporation of droplets** (Fuks), **12.1–11**; **Evaporation** (Undt), **12.1–415**.

12.1–369 **551.573**:**551.584.1**(493.1)

Antal, Emánuel, **A természetes felszín evapotranspirációja a Balaton térségében.** [Evapotranspiration of natural surfaces in the area of Lake Balaton.] *Időjárás*, Budapest, 63(2):85–93, March/April **1959.** 5 figs. (incl. photos), 2 tables, 7 refs., 3 eqs. Hungarian and English summaries p. 85. **DLC**—One of the most important objects of these topographic climatological measurements is research of the energy-balance of different surfaces. With this aim the daily march and quantity of the evapotranspiration was determined by us at three places of different geographical environment in the Balaton-area. The daily march and amount of the heat spent on evaporation was also computed. The results reflect the conditions of the period of Balaton-researches between the 29th July and 23rd Aug. 1958. Finally, the daily march of evapotranspiration was compared with the daily march of the lack of saturation, inferences were drawn concerning the use of the data of the Wild atmometer. *Subject Headings:* **1. Evapotranspiration measurements 2. Energy balance method of evaporation calculation 3. Microclimatic data 4. Lake Balaton, Hungary.**—*Author's abstract.*

12.1–370 **551.573:551.579.5**

Lowry, William P. (*Oregon Forest Lands Res. Center, Corvallis*), **The falling rate phase of evaporative soil-moisture loss: a critical evaluation.** *American Meteorological Society, Bulletin*, 40(12):605–608, Dec. **1959.** 3 figs., table, 22 refs., 2 eqs. **DWB, DLC**—This paper presents an abbreviated review of the literature concerning the relationship of evaporative moisture-loss rate to soil-moisture content. Results from a variety of sources appear to fall into four major types of curve expressing this relationship. The author compares these types and concludes that three of them are mutually supporting and represent special cases of the same process. The fourth type is considered contradictory. It is concluded further that the search for a neat, concise, general statement of the relationship under consideration is probably futile. *Subject Headings:* **1. Evaporation from soil 2. Soil moisture effects on evaporation.**—*Author's abstract.*

12.1–371 **551.573**:551.481.1(773)

Roberts, W. J. (*State Water Survey Div., Urbana, Ill.*), **Reducing lake evaporation in the midwest.** *Journal of Geophysical Research*, Wash., D. C., 64(10):1605–1610, Oct. **1959.**

10 figs., 7 refs. **DLC**—During the summers of 1957 and 1958 studies were conducted on two lakes in central Illinois to determine a practical method of applying monomolecular layers and to learn the effectiveness of the layers in reducing evaporation. Results showed a saving of 43 per cent in 1957 and 22 per cent in 1958 of the water normally lost to evaporation. A method was developed for determining the strength of the monolayer by measuring the heat gradient near the water surface. *Subject Headings:* **1. Evaporation from lakes 2. Illinois.** —*Author's abstract.*

12.1–372 551.**573**:551.481.1 551.**582**(567)

*†Wartena, L., **Het Klimaat en de verdamping van een meer in Centraal Irak.** [The climate and evaporation of a lake in central Iraq.] *Wageningen, Netherlands. Landbouwhogeschool, Mededelingen,* 59(9), **1959.** 91 p. 58 figs., 23 tables, 52 refs., eqs. English summary. **DLC**—This climatological study consists of 5 chapters and one appendix. The first three chapters deal respectively with the climate of Iraq, available climatological data, instruments used, observation methods and more especially with the care observed in measuring temperatures, sunshine and the various components of radiation. The climate of central Iraq is continental subtropical. The long summer is characterized by a low atmospheric pressure, very high temperatures, low atmospheric humidity and frequent periods of strong wind. The maximum temperatures can be ranked among the highest of the earth. It is, however, advisable not to accept statements about record temperatures without criticism. The usefulness of the evaporation pan has been discussed. The U. S. Weather Bureau Class A evaporation pan was found to be satisfactory as an evaporimeter. This was not the case with the Piche evaporimeter. In order to obtain a good understanding of the behavior of the evaporation pan, the energy-balance of the pan was calculated. It is necessary to study the heat exchange air/pan and to construct the pan of a material which in the open field will retain a constant absorption coefficient for long wave as well as for short wave radiation. The calculations are given in the appendix. Evaporation from a lake can be calculated in several ways, provided that the temperature of the surface is known. The author has attempted to calculate evaporation of the surface using elementary meteorological quantities. The method was checked on the Lake of Tiberias, and a reasonable agreement was obtained. Finally the evaporation from two fictitious lakes with depths of 10 m and 50 m was calculated. The evaporation from these two lakes appeared to be unequal. Several border effects on the evaporation, such as the influence of wind, atmospheric humidity and temperature, could only be discussed qualitatively. A quantitative treatment of the problem is not yet possible due to the insufficient knowledge of the turbulent heat transfer in air. The yearly evaporation from these two lakes appeared to be approximately 2500 mm. *Subject Headings:* **1. Climate of Iraq 2. Climatic data 3. Evaporation from lakes 4. Evaporation measurement comparisons 5. Iraq.**—*A.V. and author's abstract.*

CONDENSATION

See also: **Droplet growth** (Fuks), 12.1–11; **Icing of helicopters** (Stallabrass), 12.1–44; **Icing of aircraft** (Lewis, Perkins), 12.1–45; **Dew measurement** (Robison), 12.1–222; **Silver iodide diffusion** (Carreras-Patxot, Sänger), 12.1–264; **Ice crystal nuclei obs., Tokyo** (Nemoto et al.), 12.1–268; **Drop velocity** (Lhermitte), 12.1–384; **Hailstone formation** (List), 12.1–393; **Hailstone structure** (List), 12.1–394; **Elec. properties of dew** (Magono, Takahashi), 12.1–436; **Drop coagulation** (Makhotkin, Solov'ev), 12.1–437.

12.1–373 551.**574.1**:551.**578.41**

Dufour, L. and Defay, R., **Sur l'impossibilité de nucléation homogène de glace dans l'air humide.** [The impossibility of homogeneous ice nucleation in humid air.] *Belgium. Institut Royal Météorologique, Publications, Ser. B,* No. 28, **1960.** 12 p. 3 figs., 3 tables, 9 refs. **DLC**—According to Ostwald's law, the homogeneous nucleation of water vapor cooled down below 0°C must generate water drops and not ice crystals. The cooling down of water vapor always makes liquid germs, even when the temperature lies considerably below the freezing temperature of the liquid. The formation of ice in cool humid air should always occur in two stages: 1) the appearance of water droplets; 2) the freezing of these droplets. It is known that this rule is not a thermodynamic necessity and that it may be found faulty. Through a compendious calculation based on the free energy of the germ formation, KRASTANOW proved in 1940 the possibility of OSTWALD's rule inversion for water vapor below −65°C. Using actually better known or more probable values of superficial tensions the authors computed again: 1) the curves of equal free energy of formation referred to kT, and 2) the curves of equal nucleation velocity. Examination of these curves does not permit to foresee any inversion of OSTWALD's rule. The appearance of ice crystals in air devoid of foreign nuclei should thus always appear in two steps: 1) appearance of supercooled water drops; 2) freezing of these drops through homogeneous ice nucleation within the drops. *Subject Headings:* **1. Ice crystal formation in supercooled water 2. Freezing of water drops.**—*A.V.*

12.1–374 **551.574.1:551.578.41**

Mason, B. J. (*Dept. of Met., Imperial College of Sci. & Tech., London*), **Some recent investigations on the nature and properties of natural and artificial freezing nuclei.** *Geofisica Pura e Applicata*, Milan, 42:50–52, **1959. DLC**—Investigations have been made as to the nucleating ability of various types of soil particles and mineral dusts. Thirty substances were tested and are reported on here. The results are not satisfactory. In this report reasons for the poor results are given. *Subject Headings:* **1. Freezing nuclei 2. Artificial nucleation.** —*N.N.*

12.1–375 **551.574.1:551.578.11:551.510.42**

Nikandrov, V. Ia., **O vzaimodeĭstvii pereokhlazhdennykh vodianykh kapel' s tverdymi chastitsami.** [The interaction of supercooled water drops with solid particles.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 57(119):3–18, **1956.** 3 refs., 6 tables, 5 eqs., 10 figs. **DLC**—Visual observation and microphotography were employed to study the changes in size and shape of small solid particles (AgI, quartz sand, coal dust, etc.) when either one is in contact with water drops or through moist air by means of outgrowth of ice or dust particles. The results of the experiments show that (1) the smallest particles of substances that are both ice-like and insoluble or slightly soluble in water, can become ice nuclei; (2) the process of passage of water from supercooled drops to dust particles depends upon the degree of supercooling of the water; (3) the process of transfer of moisture from drops to ice forming particles may begin with a direct deposition of ice without the preliminary formation of an ice layer upon its surface. The freezing of supercooled drops during their contact with particles depends upon the characteristics of the latter. *Subject Headings:* **1. Freezing of supercooled water 2. Supercooled water drops.**—*I.L.D.*

12.1–376 **551.574.1:551.594.253**

Tverskaia, N. P., **Opytnoe izuchenie soudareniia i sliianiia zariazhennykh kapel'.** [Study of the collision and coalescence of charged drops.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 73: 12–131, **1958.** 4 figs., 16 refs. **DLC**—The purpose of this study is to determine the possibility of exchange of charges between drops during their collision but in the absence of coalescence and the effect of size of drops as the transformation of non-effective collision into fully effective collision, i.e. resulting in the coalescence of the drops. The experimental set up for studying the first problem consisted of an upper and lower dropper terminating in free needles with which artificial drops were produced. The drops were charged by current from a battery and the charge was measured by a single thread electrometer. The method of measurement is described in detail and the results are presented in tables: (1) it was found that the collision of charged drops occurring even without coalescence, is accompanied by exchange of charges; (2) the exchange of charges is sufficiently complete since the upper drop acquires after collision a charge almost corresponding completely to the potential of the lower drop; (3) when strongly charged vertical drops collide the decrease in the charge is greater, the less is the potential of the lower drop, and (4) the collision of charged drops, independently of the size of the charge, causes the formation of a negative charge whose relative magnitude increases as the charge of the upper drop diminishes. The experimental procedure for investigating the effect of drop charge upon the effectiveness of collision is described and the results obtained indicate the following: (1) the charge of drops promotes their collision even if the drops have relatively large dimensions ($r \simeq 1$ mm); (2) the collision of drops of the same charge appears more effective, other conditions being equal, as compared with uncharged drops; (3) in order to cause drops of the same charge to coalesce the difference in the magnitude of their charges should be greater than in the case of drops of different charge; and (4) the coalescence of charged drops favors a large atmospheric relative humidity and small relative fall velocity, providing longer contact of the drops. *Subject Headings:* **1. Electrical charges on drops 2. Cloud droplet collision 3. Coalescence of drops.**—*I.L.D.*

12.1–377 551.574.11:546.13

Podzimek, Josef (*Observ., Hradec Králové 8*), **Determination of size spectrum of chloride giant condensation nuclei.** *Studia Geophysica et Geodaetica*, Prague, 3(4):393–402, **1959.** 8 figs., 20 refs., 4 eqs. Russian summary p. 402. **DWB**—At different seasons in 1956 and 1957 thirty-three plane ascents were made in Northern Bohemia. The nuclei size was determined microscopically by the Vittori method. It was assumed that possible changes in the size spectrum of the nuclei will be influenced by the origin of the air mass and by the surface wind velocity. Measurements were carried out at several levels. Wind velocity was studied in four groups. The nuclei size spectra are plotted in a logarithmic coordinate system and on a semi-logarithmic scale. All measured cases were divided into two basic groups: the western situation in the first, the eastern and anticyclonic in the second. It was shown how particles get to higher levels by a more intensive exchange. The values of concentrations measured at different levels have a different character. No fundamental influence of the meteorological situation was found. Neither did the wind velocity, particularly when a lower velocity was concerned, cause changes in the spectral curves. *Subject Headings:* **1. Chloride nuclei size determination 2. Giant nuclei 3. Condensation nuclei spectrum.**—*E.K.*

FOG

See also: **Humidity variation in radiation fog** (Szepesi), 12.1–367.

12.1–378 551.575:551.591:656.6.08(285:71:73)

Fourth coast first major accident. *Mariners Weather Log*, Wash., D. C., 3(5):181, Sept. **1959. DWB**—A brief note on the collision between two ships in Lake Huron on June 25, 1959, due to reduced visibility caused by fog, maximum of which is shown to occur in June from the table featuring average number of days April–December. *Subject Headings:* **1. Fog effects on visibility 2. Marine accidents 3. Lake Huron.**—*W.N.*

12.1–379 551.575:551.591:656.6.08

Rodewald, Martin, **Seeunfälle und Sicht.** [Marine accidents and visibility.] *Wetterlotse*, Hamburg, No. 135:185–187, Sept. **1958.** fig. **DWB**—Authoritative 1957 statistics in Germany on sea accidents show 15% due to fog, 7% misc.—poor visibility, 37.4% due to darkness and 40.6% happen in the daylight. Other conditions are briefly discussed to show that fog ranks as navigation's enemy No. 1. *Subject Headings:* **1. Fog effects on visibility 2. Marine accidents.**—*W.N.*

12.1–380 551.575.2(423.5)

Douglas, C. K. M., **Some features of local weather in south-east Devon.** *Weather*, London, 15(1):4–17, Jan. **1960.** fig. **DWB**—On the basis of observations made at Beer, on the southeast coast of Devon and over the surrounding country, the author describes the outflow of the Axe Valley fog some miles seaward in a narrow band and the distribution of the fog in the valley and its frequency; the characteristics of sea fogs in south-east Devon; the visibility of Portland Bill, the relationship of its clearness to the incidence of measurable rain on the previous day; and the characteristics of cloud structures. *Subject Headings:* **1. Fog distribution 2. Beer, Devonshire, Eng.**—*I.L.D.*

CLOUDS

See also: **Man-made cumulus** (Jefferson), 12.1–263; **Cloud seeding with silver iodide** (Schaefer, Dieterich), 12.1–270; **Cloud photography** (Stănescu), 12.1–427; **Cloud-to-ground lightning** (Kitagawa, Brook), 12.1–431.

12.1–381 551.510.528:551.576.1/2

*Solomon, Irving, **Estimates of altitudes and probabilities of being above all clouds.** *U. S. Air Weather Service, Climatic Center, Technical Memorandum to the Director*, TM-59-2, Aug. 11, **1959.** 4 p. 16 figs., 6 refs. **DWB** (M76.4 U582es).—The basic parameter used in this study is mean seasonal tropopause height which is considered to be the maximum altitude for cloud formation. The results of the study based on estimates of 94 stations located in the North Hemisphere, were compared with data from special high altitude aircraft programs. These results can be used to assess the feasibility of employing various detection devices such as infrared and optical systems. A provisional use of these results is recommended. Sixteen figures give Northern Hemisphere coverage and show altitudes above which the probabilities of having less than one-tenth sky coverage are from 95% to 60%. The figures can also be used in the planning stages of certain types of operations. *Subject Headings:* **1. Tropopause height 2. Cloud height probabilities.**—*I.S.*

12.1–382 551.511:551.558.1:551.576.1

Förchtgott, J., **Convection cloud systems.** *Schweizer Aero-Revue*, Zurich, 35(5):323–325, May **1960.** 5 figs. **DLC**—This study is based on detailed observations of convective clouds on 69 days selected during the last 8 years. The cloud types studied were the following: 1) development of small convective circulations under calm conditions (fair weather cumulus, clear air convection); 2) cumulus deformations due to wind shear; 3) effect of varying upper air moisture on the diurnal variation of convective cloudiness; 4) extension of small scale effects to mesoscale and synoptical conditions (waves and streets of shower and thunderclouds). The interaction of rising and environmental air is considered to be the main reason for the life cycle of convectional circulation composed of early, mature and dissipating stage. Wind shear causes deformations of otherwise symmetrical circulations resulting in special Cu cloud forms. The effect of varying upper air moisture on the diurnal march of convective cloudiness is discussed. The features mentioned above in suitable combination often affect large areas and determine the development of certain convection cloud systems on the synoptic scale. The distinction of isolated Cu or Cb cloud formations, of convective waves and streets permits us a better understanding of nonfrontal weather development and of its more efficient use for cross-country flying. *Subject Headings:* **1. Convective clouds 2. Convective motion 3. Convective currents.**—*A.V.*

12.1–383 551.576.11:551.558.1:532.52

Levine, Joseph, **Spherical vortex theory of bubble-like motion in cumulus clouds.** *Journal of Meteorology*, Boston, 16(6):653–662, Dec. **1959.** 10 figs., table, 17 refs., 30 eqs. **DWB, DLC.** Also issued as Woods Hole Oceanographic Institution, Contract Cwb 9241, Technical Report No. 4, Aug. **1958.** 23 p. 11 figs., 2 tables, 19 refs., 30 eqs. **DWB**—The bubble concept is here put on a more quantitative basis by approximating the buoyant bubble in a cloud by a spherical vortex. The approximate solution of the equations of motion is made with the aid of "Hill's Spherical Vortex" as described by LAMB. In the solution as presented here two arbitrary parameters representing the aerodynamic interaction and the mass exchange of the bubble with the surrounding air are introduced. Qualitative features of the motion are independent of the parameter values. The effects of entrainment on the motion are determined by a refined application of Stommel's method of computing entrainment. The solution of the problem therefore is given in terms of integrated differential equations which for given values of the arbitrary parameters, environmental potential temperature and specific humidity, and initial conditions yield the bubble velocity and potential temperature as a function of height. Specific applications of the solution are made to bubble motions in a saturated and unsaturated environment. *Subject Headings:* **1. Cloud vortices 2. Cumulus cloud structure 3. Bubble theory.**—*Author's abstract.*

PRECIPITATION

See also: **Annual precip. chart, Antilles-Guiana** (Perrusset), 12.1–31; **Hail damage to airplanes** (Alt), 12.1–47; **Seasonal variation of stratospheric fallout** (Schumann, Eulitz), 12.1–79; **Radioactivity of people and milk** (Anderson), 12.1–84; **Solar variation effects on temp.** (Abbot), 12.1–118; **Flood rainfall, Moldavia** (Platagea, Platagea), 12.1–203; **Radar beacon for telemetering precip. data** (Saltow, Tarble), 12.1–226; **Annual rainfall summaries, Israel,** 12.1–228; **Drought, Netherlands** (Ten Kate), 12.1–231; **Quantitative rainfall forecasting** (Izawa), 12.1–257; **Precip. effects on cold air formation** (Fujita), 12.1–305.

12.1–384 551.501.**81**:551.577.**11** 551.578.**11**:551.574.**1**:531.32

Lhermitte, Roger, **Variations de la vitesse de chute des particules d'une précipitation étendue, à différents niveaux.** [Variations of drop velocity of particles of widespread precipitation at various levels.] *Académie des Sciences, Paris, Comptes Rendus,* 250(5):899–901, Feb. 1, **1960.** 2 figs., refs. **DWB, DLC**—A study of the drop velocity of particles composing gentle and widespread precipitation at various levels in the cloud, after measurements obtained with a special radar equipment. The measurement is based on the analysis of the fluctuation of the signal resulting from the mixing of the radar echo corresponding to the region of the studied precipitation and of a fixed terrestrial echo. This device permits continuous observations of the vertical speed of the particles at various levels during a precipitation. A little below the isotherm zero, maximum echo is observed which is attributed to the partial fusion of the particle at this level. This maximum is situated in a transition zone which divides two media in which the drop velocities are very different. Above this maximum, the drop velocity always presents the same general aspect and does not vary substantially with altitude. It ranges from 0.5 m/s to a maximum speed which never exceeds 2.5 m/s. This data agrees with the presence of thick rimy-flakes of snow, i.e. flakes that have collected and congealed supercooled droplets during their fall in the cloud. Below the isotherm zero, the same measurements reveal important speed modifications which occur during the fusion of the frozen particles. The maximum drop velocity of the particles in the region of maximum intensity always nears 3 m/s. Speed variations appear in the range of 400 m in altitude, which corresponds for the present case to a change in air temperature from 0 to 2°C. In the studied cases the sizes of the rain drops do not evolve anymore during their fall, and their diameter is thus entirely determined by the dimensions of their original flakes. *Subject Headings:* **1. Drop velocity 2. Particle dynamics 3. Radar echoes from precipitation.**—*A.V.*

12.1–385 551.577.**13**:546.73.02:539.16

Marquez, L.; Costa, N. L., and Almeida, I. G., (*all, Centro Brasileiro Pesquisas Fisicas, Rio de Janeiro*), **Presence of ^{57}Co in the atmosphere.** *Nuovo Cimento,* Bologna, Ser. 10, 11(1):111–112, Jan. 1, **1959.** table, 3 refs. **DLC**—The presence of Co^{57} in rainwater was established by collecting several thousand liter of rain water, adding Co carrier and passing it through an ion exchange column to retain the rations. The average activity of Co^{57} for three measurements in June, Sept. and Oct., 1957 was found to be 0.020 dpm/liter. From theoretical considerations and from the absence of radioisotopes of iron the tentative conclusion is reached that the Co^{57} in rain is not likely to originate from nuclear tests. *Subject Heading:* **1. Radioactive rainwater.**—*G.T.*

12.1–386 551.577.**36**(522.3):519.24

*Soda, M., **On the return period of daily precipitation in Saga Prefecture, Pt. 2.** *Journal of Meteorological Research,* Tokyo, 10(8):673–679, Aug. **1958.** 3 figs., 6 tables, 7 refs., eq. In Japanese. **DLC**—Part 2 deals with the method of Ogawahara, compared to Part I which used the Gumbel method. A big error was found in its calculation. By the former method, the author divided the return period of daily precipitation into 400, 200, 80, 40, 20, 8, 4 years in order that its result may be calculated, considering the characteristics of heavy rain, its frequency, and geographical factors in Saga Prefecture up to 1956. Regarding the frequency of heavy rain, the author endeavoured to show its relation to geographical factors, elevation, exposure, and orographic factors. It is pointed out that heavy rain was more frequent in the mountainous areas than in the flat areas of this region. *Subject Headings:* **1. Precipitation frequencies 2. Saga Prefecture, Japan.**—*K.C.*

12.1–387 551.577.38:628.1

Guild, William G., **Presidential address [at] Scottish section.** *Institution of Water Engineers, London, Journal,* 14(5):369–380, Aug. **1960. DLC**—The need for care in the use of water to avoid waste is discussed. The effect on Scottish water supplies of the drought in 1959 is reviewed. The effect might provoke a reexamination of water storage requirements. Water consumption in Scotland is increasing and this is thought to be mainly due to improved housing conditions. The consumption for different types of house has been estimated. The need for more careful measurement of supply and for the detection and elimination of waste is stressed. *Subject Headings:* **1. Water consumption 2. Scotland.**—*R.B.*

12.1–388 551.577.52:634.972.3:582.623

Froelich, Ronald; Shiue, Cherng-jiann; Duncan, D. P. and Hodson, A. C., **Effect of rainfall on the basal area growth of aspen as related to defoliation by the forest tent caterpillar.** *Minnesota Forestry Notes,* St. Paul, No. 48, April 15, **1956.** 2 p. 3 figs. Mimeog. **DWB** (634.9 M665mi) -Influence of April–July precipitation as studied in several localities in Minnesota, 1940-1953, was marked. In a lesser degree the correlation was found between growth and stand density. It is concluded that defoliation by the forest caterpillar, rather than precipitation, influence the growth of aspen. *Subject Headings:* **1. Precipitation effects on aspen growth 2. Forest caterpillars—tree growth relationships 3. Minnesota.**—*W.N.*

12.1–389 551.577.52:551.588.2(676.2)

Trapnell, C. G. and Griffiths, J. F., **The rainfall-altitude relation and its ecological significance in Kenya.** *East African Agricultural Journal,* Kikuyu, Kenya, 25(4):207–213, April **1960.** 2 figs., 8 refs. **DLC** –The vegetation types of southern Kenya have been found to fall into three divisible climatic series in the range between higher and moister and lower and drier conditions. The lines of division between these sequences have been drawn on a small-scale map. Their effect indicates that southern Kenya is divisible into three main sectors, referred to as the Western Decline, the Rift Highlands, and the Eastern Decline. This tripartite division is found to be associated with different combinations of rainfall and altitude, expressed in terms of the number of inches of rainfall per thousand feet of altitude. Computations for 550 stations show that the Eastern and Western Declines enjoy high rainfall-altitude ratios, falling generally between 6 and 16 in. per thousand feet, whereas the greater part of the Rift Highlands sector has only 3 to 6 in. per thousand feet. Exceptions in the Baringo-Elgeyo rift region are commented on. The lines of division otherwise correspond remarkably closely to the 6 in. isogram. This relationship may be regarded as a first approximation to one of rainfall and temperature. Its significance is discussed with reference to temperature-altitude relations and to its general bearing on bioclimatic interpretation in Kenya. *Subject Headings:* **1. Rainfall height variations 2. Orographic rainfall 3. Rainfall effects on ecology 4. Kenya.**—*Authors' abstract.*

RAIN, SNOW AND HAIL

See also: **Snow cover radiation, Maudheim** (Liljequist), 12.1-26; **Hail damage to airplanes** (Alt), 12.1–47; **House under simulated wind and snow loads** (Dorey, Schriever), 12.1-89; **Hail forecasting, Central Piedmont, Italy** (Barla), 12.1–258; **Snowstorms in spring** (Nikolaev), 12.1–308; **Freezing of water drops** (Dufour, Defay), 12.1–373; **Freezing nuclei** (Mason), 12.1–374; **Freezing of supercooled water** (Nikandrov), 12.1–375; **Drop velocity** (Lhermitte), 12.1–384; **Snow cover duration chart, Austria** (Steinhauser), 12.1–401; **Elec. charges on drops** (Makhotkin, Solov'ev), 12.1–437.

12.1–390 551.578.46 551.324.433

LaChapelle, E. (*Dept. of Met. and Clim., Univ. of Wash.*), **Winter snow observation on Mt. Olympus.** *Western Snow Conference, April 1958, Proceedings,* 26:59-63, Oct. **1958.** 2 figs., 2 tables. **DWB** (M(06) W527p)—The Blue Glacier Project is a part of the U. S. IGY program undertaken by the Department of Meteorology and Climatology, University of Washington, in order to provide new information on the nature, location, present state, past history and the dynamics of the existing glaciation in Arctic, sub-Arctic and temperate North America by examining the mass and energy exchange of such glacial areas. Details are reported in the paper. *Subject Headings:* **1. Glaciation 2. Snow cover observations 3. Mt. Olympus, Washington.**—*N.N.*

12.1–391 551.578.46:778.35:656.7

Rakhmanov, V. V. and Sapozhnikov, V. I., **I metodike aerofotos"emok snezhnogo pokrova vo vremia taianiia.** [Method of photographing snow cover from the air during the melting season.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy,* No. 44(71):95–106, 1956. 4 figs., 5 tables, 4 refs., 4 eqs. **DWB**—In using a sample survey by aerial photography to determine the amount of snow cover of an area the question arises as to the part of an area and the localities of a basin that should be surveyed. Using aerial photographs made on the basin of the Oka River and Devitsa River and subjecting the series of amounts of snow cover determined on individual photographs to statistical analysis, the author found that if the area of the basin was 40–60% covered with snow the actual distribution of snow cover is close to a normal distribution; for such percentages the mean square deviation was a maximum and equal to 16.5%. The use of random sampling to determine the area of snow cover and the reliability is illustrated with the aid of the formula $\mu = o/\sqrt{n-1}$ for determining mean sampling error. In the case of repeated surveys of the same area the method of mechanical selection of survey areas is used and the mean error in the case of unrepeated selection is given by $\mu = \sqrt{\frac{o^5}{n} \cdot \frac{N-n}{n-1}}$ (n = number of selected aggregate; N = number of total aggregate). With increasing number of samples the mean square error decreases. In order to make aerial surveys over an open dissected area on a scale of 1:10000 with an error not exceeding 5% the survey must cover 14% of the total area. Aerial surveying by means of groups or series of photographs made at definite distances along the route of the aircraft flights is examined in order to determine its accuracy. In order to obtain the same accuracy of mean cover in incomplete aerial surveying with groups (series) of photographs, it is necessary to photograph a larger area than in surveying with individual frames. The method of typical regionalization in which the number of individual or groups of photographs is selected in proportion to the area of typical districts in the area is described. Examples of the application of aerial surveying are presented. *Subject Headings:* **1. Aerial snow cover photography 2. Aerial snow surveys 3. Oka River Basin, U.S.S.R. 4. Devitsa River Basin, U.S.S.R.**—*I.L.D.*

12.1–392 551.501.4:551.578.46

Rudometov, M. V., **Raschet plotnosti snega po osnovnym opredeliaiushchim faktoram.** [Calculation of snow density from the main determining factors.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy,* No. 19:85–92, **1959.** 2 figs., table, 4 refs., 6 eqs. **DWB**—The effect of wind, pressure of upper upon lower lying snow layer, winter thaws and spring warming, and rain upon snow density has been investigated since 1948 in connection with forecasts of the characteristics of spring runoff of the western Dvina River. On the basis of data on snow depth and density at Okol'nikii for 1906–1911, 1915–1916 and at Novoe Korolevo for 1917–1919, 1924–32 and atmospheric temperature at the latter stations a linear relationship was established between snow density and sum of positive mean daily air temperatures for the period of snow cover deposition; the correlation coefficient between these was 10.84. The density of snow increased at a rate of 0.01–0.02 per day for each degree of positive air temperature. The increased density of snow under the action of its own weight is proportional to the time of its deposition and is related to the depth of the layer. The formula for determining snow density is $\epsilon = 0.01\Sigma t_{+} + 0.0001\Sigma h + 0.21$ where ϵ = snow density at end of a decad, Σt = sum of positive mean daily air temperatures, Σh = sum of decadal heights of snow. The effect of moderate wind, 4–5 met/sec is taken into account by the above equation since it is constant in relation to the decadal period. In the case of strong winds, 6–10 m/sec, the density of snow computed by the above equation must be increased by 0.0024. The density of snow if rain is taken into account is given by $\epsilon_2 = \epsilon_1 - (0.1x/h)$ where ϵ_2 = density of snow computed taking into account rain, ϵ_1 = density of snow without taking into account rain, x = rain precipitation during a decadal period. Corrections to the computed density of the snow cover because of new fallen snow and an equation for determining diminishing snow density after snow fall are presented. The complete equation for snow density is $\epsilon = k_{mc}(0.01\Sigma t_+ + 0.0001\Sigma h + 0.0024n - \Delta\epsilon + 0.21)$ where k_{mc} = moisture capacity of snow, n = number of days with wind ≥ 6 m/sec and $\Delta\epsilon$ = diminished snow density. If the amount of rain precipitation per decad is less than the water capacity of snow then $\epsilon = 0.01\Sigma t_+ + 0.0001\Sigma h + 0.0024n - \Delta\epsilon + 0.21 + 0.1x/h$. The computations of density of snow cover for the last decadal period of the winter 1954/1955 for the station Shors (Chernigov Region) is presented in a table. *Subject Headings:* **1. Snow density calculation 2. Chernigov Region, U.S.S.R.**—*I.L.D.*

12.1–393 551.**574.1**:551.**578.71**:533.6.07

List, Roland, **Der Hagelversuchskanal.** [Wind tunnel for the study of hail.] *Zeitschrift für Angewandte Mathematik und Physik*, Basel, 10(4):381–415, **1959.** 18 figs., 18 refs. English summary p. 414–415. Also issued as Switzerland. *Eidgenössische Kommission zum Studium der Hagelbildung und der Hagelabwehr, Wissenschaftliche Mitteilungen*, No. 21, **1959. DLC**—In the framework of the research by the Federal Commission for the study of hail, the Federal Institute for the study of snow and avalanches has built a wind tunnel which will permit the artificial production of hailstones and the observation of their formation. The speed and temperature of air, the number and diameter of supercooled water drops and the number of ice forming nuclei may be regulated in accordance with the natural conditions. On the other hand, to take notice of the influence of pressure, one must resort to the similitude equations. In the present study, the author describes in a very detailed manner the construction and functioning of the various parts of the apparatus of which he studies the possibilities. The last chapter concerns the measuring methods. *Subject Headings:* **1. Hailstone formation 2. Ice nuclei 3. Wind tunnel experiments.**—*From Author's abstract.*

12.1–394 551.**574.1**:551.**578.71**:533.6.07

List, Roland, **Wachstum von Eis-Wassergemischen im Hagelversuchskanal.** [Behavior of ice and water mixtures in a wind tunnel for the study of hail.] *Helvetica Physica Acta*, 32(4):293–296, **1959.** 4 figs., 3 refs. Reprinted as *Switzerland. Eidgenössische Kommission zum Studium der Hagelbildung und der Hagelabwehr, Wissenschaftliche Mitteilungen*, No. 24, **1959. DLC**—The tests made in the wind tunnel by the author prove the existence of water-filled cavities within the hailstones. The technique of the tests is very difficult as they are supposed to be done at about 0°, the phase changes observed being otherwise always attributable to a secondary process. *Subject Headings:* **1. Hail structure 2. Hailstone size 3. Wind tunnel experiments.**—*A.V.*

HYDROMETEOROLOGY

See: **Sec. F3**, p. 55; **Hydrogeology** (Fourmarier), 12.1–10; **Hydrologic conf.** (Logvinov), 12.1–27; **Plowing effects on soil moisture, Altai Province** (Fesko, Strugaleva), 12.1–56; **Soil temp.-soil moisture relationships** (Trénel et al.), 12.1–328; **Soil moisture effects on evapotranspiration** (Lowry), 12.1–370.

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See also: **Geog. climat.** (Gentilli), 12.1–8; **Hist. of climat., U.S.S.R.** (Borisov), 12.1–35; **Hist. of climat., Ukraine** (Buchinskiĭ), 12.1–36; **Climat. data for planning electric power lines** (Muretov), 12.1–96.

12.1–395 551.58(02):061.6

†de Percin, Fernand P. and Falkowski, Sigmund J., **Handbook of the Quartermaster Research and Engineering Center environment and climatic test facilities.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Technical*

Report EP-62, Sept. **1957.** 66 p. 50 figs. (incl. maps, photos.), 10 tables, 28 refs. **DWB** (M86 U585t)—The Quartermaster Research and Engineering Center at Natick, Mass. is well equipped for all weather recordings and observations. Its climatic and geographic location makes it ideal for such purposes. This report describes the Center, the vicinity and the work of the different laboratories. The main highlights of this handbook are on the climatic test facilities at the Center, tables and graphs drawn from the data obtained there and on the climate, topography and the vegetation of the environment. *Subject Headings:* **1. U. S. Quartermaster Research and Engineering Center 2. Climatic laboratories 3. Handbooks.** —*N.N.*

CLIMATIC ZONES

12.1–396 551.581(669)

Hodder, B. W., **Note on delimiting the humid tropics: the case of Nigeria in West Africa.** *Ibadan, Nigeria. Univ. College. Dept. of Geography, Research Notes,* No. 10:1–7, June **1957.** 3 figs., 15 refs. **DWB**—A Special Commission on the Humid Tropics has been set up by the International Geographical Union. This indicates a growing interest in the geography of low latitude countries. This paper makes a few preliminary observations on delimiting the humid tropics, especially in a Nigerian and West African context. In West Africa, meteorological data are far from satisfactory in the 200 mile broad semi-arid zone between latitudes 13°N and 16°N. From the Nigerian point of view, the problem of defining the humid tropics becomes most interesting at and beyond the northern boundary of Nigeria in French territory. In West Africa, the temperature limit to the humid tropics as defined by the 16″ isohyet, is 68°F–70°F. This holds good for Nigeria too. Illustrative maps are given. *Subject Headings:* **1. Humid tropics 2. Nigeria.**—*N.N.*

CLIMATE OF PARTICULAR PLACES

See also: **Climate, U.S.S.R.,** 12.1–4; **Climate, Tadzhik S.S.R.** (Chernyshev), 12.1–12; **Climate, Greece** (Iliopoulos), 12.1–13; **Climate, Syowa Base, Antarctica** (Murakoshi), 12.1–24; **Climat. data, Argentine Antarctic,** 12.1–25; **Annual precip. charts, Antilles-Guiana** (Perrusset), 12.1–31; **Climatic charts** (Vilkner), 12.1–219; **Annual climatic data summaries, Israel,** 12.1–229; **Annual met. data summaries, Geneva** (Ruche), 12.1–230; **Annual climatic summaries, Netherlands** (Ten Kate), 12.1–231; **Climate, Negev** (Mané), 12.1–232; **Climate, Lvov** (Bershchanskiĭ), 12.1–260; **Climate, Iraq** (Wartena), 12.1–372; **Climate, E. Africa** (Griffiths), 12.1–413; **Climate, Tibet,** 12.1–414.

12.1–397 551.515:551.582(962.1) 551.589

§D'Hauteserre, M. A., **Les perturbations atmosphériques et le climat de la Polynésie Française.** [Atmospheric disturbances and climate of French Polynesia.] *France. Météorologie Nationale, Monographies,* No. 18, Jan. **1960.** 62 p. figs., charts, tables. **DWB**—This monograph on the climatology of French Polynesia, subdivided in 3 chapters, contains a great quantity of statistical data. The first chapter attempts to connect the predominant facts of the climate and various types of weather prevailing in this region with fluctuations of the general atmospheric circulation. The author successively examines the types of weather prevailing in French Polynesia under the action of the easterly waves, the intertropical convergence zone, the trade-winds front and the westerly disturbances. A survey on tide-races (Tsunami) caused by earthquakes, storm-tides and tropical cyclones is given. Some schematic synoptic charts (pressure and fronts) relating to certain characteristic situations are reproduced and illustrate the influence of fluctuations in the general atmospheric circulation upon climate of this region. The second chapter deals with climatology, properly so called, of French Polynesia which consists of two fairly well defined seasons: a warm season from November to the end of April and a cold season from May to October. Between the 13th and 23rd parallel, the warm season is also rainy. However, in the South of the Tropic of Capricorn the distribution of rains tends to be inversed because of the northward motion of the polar disturbances during the Southern winter. Considerations are expressed on the means, extremes, variations and geographic distribution of temperature, humidity, sunshine, cloudiness, surface and upper-air wind, atmospheric pressure, pluviosity, thunderstorms, hail and status of the sea. The last chapter includes in the form of tables the average and extreme values of climatological measurements made since several years in the principal stations of the Territory. Each of these tables is preceded by a short descriptive note of the corresponding observation station. *Subject Headings:* **1. Climate of French Polynesia 2. Atmospheric disturbances 3. Weather type-climate relationships 4. French Polynesia.**—*A.V.*

12.1–398 551.582/3(46) 551.524.32(46)

†Lautensach, Hermann, **Die Temperaturverhältnisse der Iberischen Halbinsel und ihr Jahrhresgang.** [Temperature conditions on the Iberian Peninsula and their annual course.] *Die Erde*, Berlin, 91(2):86–114, **1960.** fig., 3 charts, bibliog. p. 110–114. **DWB, DLC**—This geographical investigation is based on the 20 year long monthly temperature reports of all appropriate Spanish and Portuguese weather stations. Gilbraltar and Andorra are included. Where the continuity of observations within the period is broken, the values are restricted to the period 1906–25. The data is compiled under the supervision of the author by eight students for doctoral degrees. The accompanying charts of mid-January temperatures, mid-August temperatures and the annual variations in monthly temperature reports, as well as the forty diagrams, are all based on reports from the 347 stations. The contents of these charts and diagrams are minutely substantiated. There are also investigations into the middle period daily variations and extreme of temperature. The monthly mean values are based on a description of the Iberian atmospheric conditions and their efficacy in different months. In this connection numerous examples are cited. In the light of daily reports over many years from four of the Iberian stations, the course of the thermal year and its fixed points are enucleated. *Subject Headings:* **1. Climate of Iberian Peninsula 2. Annual temperature variations 3. Iberian Peninsula.**—*A.V.*

12.1–399 91.04(99) 551.582.2(99)(267)

Doyen, Paulette (*Centre National de Recherches Polaires, Belgium*), **Heard, île subantarctique de l'Ocean Indien.** [Heard, subantarctic island in the Indian Ocean.] *Société Royale Belge de Géographie, Bulletin*, 83(1/2):92–114, July **1959.** 2 figs., 13 photos, 14 refs. **DLC**—Heard Island, with its 375 km² surface, is only a surface manifestation of a series of relatively high shoals which stretch across the Indian Ocean southward toward the Antarctic Continent, known as the Kerguelen-Gauss chain. For its latitude, it is one of the coldest islands. The mean temperatures at Atlas Cove is near to +1°C, the mean temperature of the warmest month (February) is +3°3 C and that of the coldest month (September) −1°C. The extreme temperatures are in the range of +14°C and −10°C. Sunshine duration is very short; the maximum daily duration is 3 hrs and occurs in November. This island is situated in an area of almost uninterrupted storms. The mean pressures are comprised between 990 and 1000 mb. The mean wind velocity is comprised between 130 and 150 km/h; winds often reach 200 km/h with peaks attaining 240 km/h. The annual precipitation amounts from 1380 to 856 mm; the maximum occurs in April and the minimum in August. Of 280 to 300 days with precipitation, 50% had snow. Various paragraphs are devoted to the geology, the glaciation, the biology of this island which presents a large interest by its exceptional geographical location. Mention is made of the geophysical research (meteorology, geomagnetism, auroras, cosmic radiation and seismology) done in the Island by the Australian National Antarctic Research Expedition. *Subject Headings:* **1. Climate of Heard Island 2. Australian National Antarctic Research Expedition 3. Heard Island.**—*A.V.*

12.1–400 551.582.2(438) 551.586

Tyczka, Sabina (*Inst. Balneoklimat., Poznań*), **Klimat i bioklimat Inowrocławia.** [Climate and bioclimate of Inowrocław.] *Przegląd Geofizyczny*, Warsaw, 4(1):39–50, **1959.** 5 figs. (1 fold.), 4 tables, 10 refs. English summary p. 50. **DWB, DLC**—General characteristics of the climate of Inowrocław were worked out by means of the methods of averages on the basis of material of the Inowrocław Meteorological Station covering a period of 20 years. The most significant values of the meteorological observations are presented in Table 1. The second part of the paper aims at discerning bioclimatic characteristics. To this end the Fiodorow-Czubukowa method was used which allows to demonstrate the diversity of weather conditions and the frequency of their occurrence (Fig. 1), due regard having been paid to the specific bioclimatic elements. Fig. 2 gives air-temperature variations from day to day in percent. The frequency and duration of weather conditions (bright and cloudy) shown in Fig. 3, indicate the structure and rhythm of meteorological states. For determination of the sensed climate complex bioclimatic indicators were used: equivalent temperature, physiological saturation deficit according to Gadzikiewicz (Fig. 4) and Scharlau's index of sultriness. Occurrence of individual types of sensed weather according to Leistner's classification is shown in Fig. 5. *Subject Headings:* **1. Climate of Inowrocław 2. Bioclimatology of Inowrocław 3. Inowrocław, Poland.**—*Author's summary.*

12.1–401 551.582.3:551.578.46(436)

Steinhauser, F., **Karte der Andauer der Schneedecke in Österreich, 1901–1950.** [Map of the duration of snow cover in Austria, 1901–1950.] Issued by the Zentralanstalt f. Meteorologie und Geodynamik, Vienna, (**1957?**). 1 sheet fold. (90×120 cm), in color. Scale 1:500,000—A large, multicolored wall chart of Austria showing annual duration of snow cover in Austria for 1901–50 on a 1:500,000 scale, showing categories of <30 days, 30–40, 40–50, 50–60, 60–75, 75–100, 100–150, 150–200 and >200 days. Lines follow topography quite accurately in mountainous areas. *Subject Headings:* **1. Snow cover duration charts 2. Austria. I. Austria. Zentralanstalt für Meteorologie und Geodynamik.**—*M.R.*

12.1–402 551.582.3:551.521.11(436)

*Steinhauser, F., **Die Sonnenscheindauer in Österreich.** [Sunshine duration in Austria.] Issued Vienna, Zentralanstalt f. Meteorologie u. Geodynamik, (**1957?**). 4 sheets folded (35×50 cm), in color. Scale 1:1,500,000.—Four large many-color charts showing areas of equal percentage of possible sunshine (duration) in steps of 5% from <25% to >50% (winter) and <40% to >60% summer and fall, and <40% to >50% in spring, based on data for 1928–50 inclusive. Charts are large size (1:1,500,000). *Subject Headings:* **1. Sunshine duration charts 2. Austria.**—*M.R.*

CLIMATIC CHANGES

See also: **Sec. F4,** p. 59; **Climatic trends** (Landsberg), **12.1–34; Solar effects on met. periods** (Clough), **12.1–119; Warming of Arctic** (Lange), **12.1–318; Temp. trends, Eng.** (Manley), **12.1–319.**

12.1–403 551.465:551.526.6:551.583.14(261)

Bjerknes, Jakob (*Univ. Calif., Los Angeles*), **The recent warming of the North Atlantic.** (In: Bolin, Bert, (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 65–73. 3 figs., 14 refs.) **DLC**—The maximum rate of rise of sea surface temperature is found along the Gulf Stream from Cape Hatteras to the edges of the Newfoundland Banks. It has persisted there from the eighteen-nineties to the present. A belt from Ireland to the edge of the Labrador current was not warmed up during the same period although it is traversed by the northern branches of the Gulf Stream. North of that belt the warming started around 1920 together with the spectacular amelioration of climate in Greenland, Iceland and Scandinavia. Most of the observed secular changes in ocean temperature south of 50°N can be interpreted as having been caused in part by increasing wind drag, which has speeded up the Antilles Current and the Gulf Stream and possibly also by increasing thickness of the warm surface layer in the areas of increasing anticyclonic wind drag. Between 50° and 57°N the corresponding surface cooling, connected with a thinning out of the surface layer by increasing cyclonic wind drag, partly also assisted by increasing cold winds from North America, must have been strong enough to overcompensate the advective warming in the belt from Ireland to the edge of the Labrador Current. *Subject Headings:* **1. Sea surface temperature variations 2. Secular trends in temperature 3. Warming of North Atlantic.**—*Author's abstract.*

12.1–404 551.583.2:551.524.36(436)

Dolezal, Erich (*Vienna*), **Winterkälte in Noricum.** [Winter cold in Noricum.] *Wetter und Leben,* Vienna, 12(3/4):70–71, **1960.** German and English summaries p. 70. **DLC**—

According to the biography of the Saints-Severin during the period from 462 to 482 A.D. the Danube river was frequently covered by ice. *Subject Headings:* **1. Cold winters 2. Austria.** —*Author's abstract.*

12.1–405 551.524.2:551.583.3:551.521.12

Simpson, George C., **World temperatures during the Pleistocene.** *Royal Meteorological Society, Quarterly Journal*, 85(366):332–349, Oct. 1959. 6 figs., 3 tables, 5 refs. **DWB, DLC**—In previous papers it has been shown that the glacial and pluvial periods of the Pleistocene can be explained qualitatively on the assumption that during this period there were three oscillations of solar radiation. Accepting this assumption the present day zonal temperatures—mean temperatures along a circle of latitude—are considered and the physics of the relationship between changes in solar radiation and the consequent changes in the zonal temperatures are discussed. By a graphical method of trial and error a family of curves relating the zonal temperatures of all latitudes with the oscillations of the solar radiation is prepared and discussed. These results are tabulated and used to plot curves showing the variations of the zonal temperatures of five latitudes between the Equator and the North Pole during a complete cycle of solar radiation and applied to the glacial and interglacial periods. The difference between the actual temperatures of any place and the zonal temperature of the latitude on which it is situated —the so-called temperature anomaly—is then discussed and two diagrams are prepared showing the local temperatures at places in the British Isles and North America during the last cycle of solar radiation embracing the period from the beginning of the Mindel-Riss interglacial to the present day. The geological evidence for the temperatures thus derived is briefly discussed. *Subject Headings:* **1. Pleistocene temperatures 2. Solar radiation variations.**—*Author's abstract.*

MICROCLIMATOLOGY

See also: **Weather-crop relationships** (de Haan), 12.1–52; **Shelter belt effects on microclimat.** (Marion), 12.1–63; **Forest influences on micromet.** (Paszyński), 12.1–65; **Microclimat. forecasting** (Platt, Williams), 12.1–66; **Forest microclimat.** (Pasák), 12.1–67; **Forest microclimat.** (van der Poel, Stoutjesdijk), 12.1–68; **Carbon disulfide in atmos.** (Gil'denskio'ld), 12.1–273; **Automobile exhaust pollution** (Dubrovskaia), 12.1–277; **Microclimat. data, Lake Balaton** (Antal), 12.1–369.

12.1–406 551.584

Temnikova, N. S., **O metodakh izucheniia mikroklimata.** [Methods of studying microclimate.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:45–48, May 1959. 7 refs. **DWB, DLC**—A description and critique of the use of a method of analyzing background maps for obtaining mean micrometeorological corrections, is presented. The long period data of a given meteorological element are plotted on a map and the values are then analyzed. The types of locations of all those points whose data stand out on the maps in comparison with open level localities, are indicated. The difference of the index of the meteorological element for points situated in concrete geographical conditions is computed directly from long period data in comparison with the adjacent open level localities. The inadequacy of this method especially the ignoring of circulation conditions, the non-repeatability of microclimatic conditions because of the limited extension of the area investigated, etc., are discussed. The procedure of microclimatic surveys as carried out in the Baltic states is illustrated by the example of Riga Hydrometeorological Observatory. In the Baltic region it was important to study the influence of hilly relief upon climate. Observations were carried out on slopes and adjacent valleys and summits close to stations where detailed contour maps with 1–2 meter intervals are required. In the absence of such maps it is necessary to determine the relative position of the microclimate point above the slope and the summit above the valley, the grade of the slope in degrees and the exposition of the slope. At least 6 such points are necessary. The vegetation, soil, degree of soil moisture, swampiness, etc. must be described. The installation of the thermometers, the execution of seasonal observations and choice of seasonal location, the execution of observations for temperature summation, etc., are discussed. *Subject Heading:* **1. Microclimatological research.**—*I.L.D.*

12.1–407 551.584.33:551.457(474.2)

Maazik, E., **Ob izmenenii mikroklimata bolot Estonskoĭ SSR.** [Change in the microclimate of swamps in the Estonian SSR.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai*, Vol. 3, Geofizika, Hidrologija, issued Vilna, **1956.** p. 56–58.—The author investigated the microclimatic regime of several swamps in the Estonian SSR, the effect of drainage upon the microclimates of swamps, and the possibility of changing microclimates by drainage; also the variation in heat conductivity of the soil produced by different ground water levels, and the influences of forest belts upon the microclimate of drained swamps were investigated. The temperature conductivity was higher in the drained low-lying swamps than in the undrained swamps and the maximum temperature conductivity was retarded 1 to 2 hours in the latter as compared with the former. By day the heat exchange of the drained swamps was on the average two times greater than in the undrained swamp. The natural swamps had higher maximum and higher minimum air temperature than the drained swamp. In drained swamps the relative humidity was on the average 3–4% higher than on adjacent fertilized soil; on the undrained swamp the relative humidity was 4–12% greater than in the drained swamp. The heat exchange between soil and air was greater over the drained than over the undrained swamp. Near forest strips higher air temperature and higher relative humidity are observed. The amplitude of the soil surface near forest strips was about 1–2° less than at a distance of 300 meters, etc., etc. *Subject Headings:* **1. Swamp microclimatology 2. Estonian S.S.R.**—*I.L.D.*

12.1–408 551.506.22:551.324 551.584.34

Businger, J. A., **De blue glacier.** [The Blue glacier.] *Hemel en Dampkring*, The Hague, 58(4):81–88, April **1960.** 8 figs. **DWB, DLC**—During the Geophysical Year research has been done on the Blue Glacier situated on the western coast of the U. S. This glacier is the biggest and the most active of the N.W.-U. S. The western predominating winds bring important precipitation, mostly in winter (5 m a year). Research was done under the direction of E. LA CHAPELLE to compute the energy and mass balance and also to make a study of the microclimate of the snow layer. The accumulated snowfall during winter and erosion during summer was recorded; measurements of temperature, humidity and winds on different altitudes above the snow layer were made. Summer 1958 was exceptionally sunny and warm; decrease of the glacier by erosion was higher than its increase by accumulation. A figure gives the daily water values coming from snow melt with a maximum of 2.000.000 m^3 a day at the end of July. The ice is melting one month after the snow (layer 4 to 6 m). Another figure gives the energy balance 1957/58; graphical representation of the gr/cal number received at the Blue Glacier from the end of October 1957 till the end of October 1958. A third figure gives the difference between the mass received to the end of April 1958 and the mass carried away by evaporation and melting. The observation period was too short to explain certain phenomena of microclimate. 1959 was more favorable and during 1960 research will be done on winds and temperature presenting some anomalies. *Subject Headings:* **1. Glacier research 2. Glacier-meteorological observations 3. Glacier microclimatology 4. Glaciers Northwest U. S. 5. IGY glaciology program.**—*A.V.*

12.1–409 551.584.4:63

Sprague, Milton A. (*New Jersey Agricultural Exp. Sta.*), **Microclimate as an index of site adaptation and growth potential.** *American Association for the Advancement of Science, Wash., D. C. Publication*, No. 53:49–57, **1959.** 9 refs. **DWB** (M86.58 A512gr)—Microclimatology generally refers to weather on a global scale with measurements reflecting large air masses and great distances. There may be many different microclimates within short distances of each other; all of which are determined by and yet have an influence on, the vegetation present. The knowledge regarding microclimate can be used for the choice of a crop to fit a given microclimate plus modifications of that climate to suit best the needs of crop. The paper deals with temperature as such and as a function of survival, light relationship, and atmospheric moisture. It is concluded that mulch materials, northern and southern slopers, irrigation and companion crops may well be used for altering the microclimate to the advantage of grassland agriculture. *Subject Heading:* **1. Microclimatic influences on agriculture.**—*I.S.*

12.1–410 551.584.5(436.14)

Fischer, P. Leander, **Der winterliche Strassenzustand 1957/1958 in Wien, I., Schottengasse und Helferstorferstrasse.** [Winter street conditions 1957/1958 in Vienna, Pt. 1, Schottengasse and Helferstorferstrasse, continued.] *Wetter und Leben*, Vienna, 10(5/7):87–89, **1958.** diagrams (folded, laid in), table. **DLC**—The mild winter of 1957/1958 is divided into three periods: (1) a long pre-winter from end of November to Feb. 5, during which the temperature minimum (−8.0°C) for the entire winter occurred; (2) later main winter: February 1 to end of March and (3) a short insignificant post winter: up to April 10. A detailed account is given of the street conditions, such as snow, ice, slipperiness, slush, etc. as related to air temperature and precipitation during these periods. A table giving data on the frequency of individual street conditions and graphs showing the street conditions are presented. (For first part of this title, *see* 10.2–315, Feb. 1959, *Met. Abstracts.*) *Subject Headings:* **1. Street microclimatology 2. Urban climates 3. Vienna, Austria.**—*I.L.D.*

12.1–411 551.584.65 551.525.6:551.524

Popescu, Elena, **Citeva date topoclimatice din peştera Dîmbovicioara.** [Some topoclimatic data of the Dimbovicioara cave.] *Meteorologia, Hidrologia şi Gospodărirea Apelor*, Bucharest, 3(2/3):115–117, **1958.** 4 figs. **DWB**—Temperature data obtained in the cave on two days (July 20 and Nov. 9, 1957) are presented for the ground level and 50 cm, 1 and 2 m above the ground. The graphs indicate considerable diurnal variation at the cave's opening and stability at the bottom. The cave is about 500 ft in length and has only one opening. Relations between cave temperatures and atmospheric temperatures, soil temperature, radiation, etc., and other details are discussed. *Subject Headings:* **1. Cave temperatures 2. Cave microclimatology 3. Dimbovicioara cave, Romania.**—*G.T.*

CLIMATIC CLASSIFICATION

12.1–412 551.585

Schulze, Alfred, **Weg und Ziel der Klimaklassifikation.** [Methods and aims of climatic classification.] *Geographisches Taschenbuch*, Jungingen, Hohenzollern, **1956/1957.** p. 429–433. 3 refs. **DLC** (G72.G4), **DWB**—Various methods of climatic classification are briefly reviewed and the need for further work in this field is stressed. Such work, it is believed, should be aimed at classifying climate according to special viewpoints (as opposed to the general methods used in the past) and by small regional units rather than on a universal scale. *Subject Heading:* **1. Climatic classification techniques.**—*G.T.*

12.1–413 551.585.5 551.582.2(67)

Griffiths, J. F. (*East African Veterinary Research Organization*), **Climatic zones of East Africa.** *East African Agricultural Journal*, 23(3):179–185, Jan. **1958.** map, 2 refs. **DWB** (M82.2/676 G855cL), **DLC**—East Africa is divided into ten zones according to rainfall amount and variability, diurnal range and seasonal variations of temperature and relative humidity. Extreme values of average temperature, rainfall, cloudiness, relative humidity, evaporation, sunshine and wind, and stations at which they have been observed are listed. *Subject Headings:* **1. Climatic zones 2. Climate of East Africa 3. East Africa.**—*G.T.*

12.1–414 551.585.7(515)(235.24)

Le climat du Tibet. [The climate of Tibet.] *La Nature*, Paris, No. 3299:94, March **1960.** **DLC**—Short survey of the climate of Tibet, based on data gathered by a Chinese expedition and published in *Priroda* (Sept. **1959**). The Tibetan plateau, situated at an altitude between 3600 and 4500 m, enjoys a relatively high temperature, specially in summer. At Lhasa (alt. 3658 m), the mean temperature exceeds 10°C during the five warmest months. The diurnal variation of temperature sometimes reaches 28 to 29°C. The air is dry and radiation very intense; the insolation increases by about 1% every 100 m altitude. Precipitation is bound to the SW monsoon. The south slope is less humid than the north. Precipitation is more abundant in the valley (about 1000 mm a year) than at higher altitudes (450 mm at Lhasa and 200 mm in the lake region). Short survey of vegetation zones and climatic zones of Tibet which seems to constitute a heat source and to have some influence on the atmospheric circulation of the bordering regions is given. *Subject Headings:* **1. Climate of Tibet 2. Mountain climate 3. Tibet.**—*A. V.*

BIOCLIMATOLOGY

See also: **Acclimatization of nutria, Tadzhik S.S.R.** (Chernyshev), 12.1–12; **Acclimatization in an ice-covered area,** 12.1–14; **Agromet. conf.** (Logvinov), 12.1–27; **Weather-crop relationships** (de Haan), 12.1–52; **Climat. data, Kazakhstan and Pricaspia** (Fedoseev), 12.1–59; **Weather effects on livestock** (Mitchell), 12.1–60; **Shelter belts, Jutland** (Marion), 12.1–63; **Bioclimat. of Inowrocław** (Tyczka), 12.1–400.

12.1–415 551.586:551.524:551.573:612.014.4(436.14)

Undt, W., **Die Äquivalenttemperatur in Wien.** [The equivalent temperature in Vienna.] *Wetter und Leben,* Vienna, 10(8/10):144–149, **1958.** 4 tables. **DLC**—Equivalent temperature is measured by the formula $E=T+mL/C_p$, where T=air temperature; L=heat of evaporation (condensation); C_p=specific heat of dry air at constant temperature; m=mixing ratio (gr water vapor per grams of dry air). This formula can be simplified to $E=T+2e$ if $m=0.622(e/p)$, $p=755$ mm Hg; e=vapor pressure at temperature T. Equivalent temperature is applicable in bioclimatology for establishing sultriness, wet cooling power, etc.; in some situations it corresponds to heat sensation. It is relatively independent of gustiness and precipitation and is influenced only by evaporation and condensation processes in the environment. Data are presented on the ten year monthly and annual means of equivalent temperature in Vienna for 1901–1950, mean monthly and mean annual equivalent temperatures at 1700, 1400, and 2100 o'clock in Vienna during 1953–1957, and frequency distribution (per 1000) of equivalent temperatures at 1701 and 1400 o'clock in Vienna for May–October, and November–April during 1953–1957. The subjective warmth sensations corresponding to equivalent temperature in the absence of air movement as determined by W. LEISTNER are presented. These are 46–56°C —transitional region, depending upon whether temperature or humidity exceeds a threshold value, 32–46°C—comfort region; 32°C—chilling region. *Subject Headings:* **1. Equivalent temperatures 2. Bioclimatology 3. Evaporation 4. Vienna, Austria.**—*I.L.D.*

ENVIRONMENTAL INFLUENCES

See also: **Urban climat.** (Rózański), 12.1 7; **Forest influences on microclimat.** (Paszyński), 12.1–65; **Environmental influences on radio links beyond the horizon** (du Castel), 12.1–101; **Radioclimat. influences on radio links beyond the horizon** (Misme), 12.1–104; **Topographic effects on clear air turbulence** (Turner), 12.1–337; **Orographic effects on wind** (Milosavljevic), 12.1–347; **Orographic effects on rainfall** (Trapnell, Griffiths), 12.1–389.

12.1–416 551.588.2:631.4:551.524.36/37:551.525.4(478)

Lysak, G. N., **Vliianie rel'efa na temperaturu pakhotnogo gorizonta chernozema.** [Effect of relief upon the temperature of the arable horizon of chernozem soil.] *Pochvovedenie,* Moscow, No. 12:98–103, **1957.** 7 tables. English summary p. 103. **DLC**—The effect of local relief upon the temperature of the arable horizon was investigated on the Chermasan-Demskaĭ steppe of the Bashkir A.S.S.R. The climate, relief and physical and chemical soil properties of the steppe are described. Elevated elements of the relief (watershed plateaus, upper parts of slopes) were characterized by smaller oscillations of daily temperature amplitudes. Maximum and minimum temperatures were less pronounced. Frosts were rare in the fall-winter period and they were less severe. In the lower relief elements a relatively more severe temperature regime prevailed in the arable horizon of the soil. A large temperature oscillation existed between the diurnal warming and morning cooling. The maximum and minimum temperatures were more pronounced. Frosts were more frequent in the fall-winter period. Data on temperature of various depths and on the crop yields on different soils are presented. Yields of thermophilic crops (millet, buckwheat, maize) on the lower elements of the soil were less than on the higher elements; this may not be the case with summer wheat and oats. *Subject Headings:* **1. Topographic influences on temperature 2. Soil temperature data 3. Chernozem 4. Bashkir A.S.S.R.**—*I.L.D.*

12.1–417 551.588.2:551.515.8:551.513.1

†Vadhanapanich, Charoen, **An investigation of the combined influences of large-scale differential heating and orographic obstacles in creating quasi-permanent forced perturbations of the circumpolar westerlies.** Florida, State Univ. Dept. of Meteorology, Contract NONR-1600(00), Technical Report, No. 10, March 15, **1958.** 51 p. 8 figs., table, 23 refs., 29 eqs. **DWB**—An attempt has been made in this study to test the hypothesis that the residual disturbances of the circumpolar westerlies which appear on long term mean monthly charts are due to the quasi-steady influences of forcing effects. The result of the investigations during the winter is good, but the effects of these disturbances during winter and summer are of the same order of magnitude. This suggests that the statistical mean perturbations are only partially a result of steady forcing influences and a result of the development and movement of individual day-to-day perturbations, which in turn is related to the fixed forcing effects. *Subject Headings:* **1. Orographic effects on westerlies 2. Circumpolar westerlies 3. Large scale weather processes.**—*N.N.*

12.1–418 551.588.6:551.524.31 551.524.37:632.111.5

South Carolina. Sandhill Experiment Station, Pontiac, **Detailed temperature observations, Sandhill Experiment Station March 1959.** [1959]. 4 p. fig., table. Carbon of typescript. **DWB** (M06.2/757 S726de)—For the purpose of studying the effect of a cover crop on minimum temperatures and for obtaining meteorological data during periods of cold weather damage to the perspective fruit crop, detailed temperature observations made in the vicinity of the Sandhill Experiment Station during March 1959 are reported and tabulated. Five observing points were set up within the orchard. As also indicated in the attached diagram, stations 1, 4 and 5 were in an uncultivated area while 2 and 3 were in a clear cultivated position. The temperature observations were made daily. Factors concerning topography and temperature variations are discussed and it is reported that frost damage to the rye crop was negligible. Through the experiment meteorological data was compiled for use in studying frost damage control, local orchard variations due to terrain, cover, etc. These data will be analyzed after additional material is collected. *Subject Headings:* **1. Cover effects on frost damage 2. Diurnal temperature variations 3. Vegetation influences on climate 4. Pontiac, S. C.**—*I.S.*

SYNOPTIC CLIMATOLOGY

See also: **Weather type classification** (Schüepp), 12.1–255; **Weather type-climate relationships, French Polynesia** (D'Hauteserre), 12.1–397.

12.1–419 551.589(234.3)

Lauscher, Friedrich (*Vienna*), **Studien zur Wetterlagen-Klimatologie der Ostalpenländer.** [Studies on the climatology of weather situations over the East Alpine countries.] *Wetter und Leben*, Vienna, 10(5/7):79–83, **1958.** 2 tables. **DLC**—The author establishes and defines the following weather situations, namely, (1) high pressure *H* with the associated forms of "intermediate high" *h* and "zonal high pressure bridge" *Hz* (from the Azores high to a high over eastern Europe); (2) high pressure marginal situations with prevailing anticyclonic weather such as *HiE* high in the east, *HF*=high over Fennoscandia and *HNW*=high over England and Scotland; (3) extensive linear flow aloft (N, NW, W, SW, W); (4) low pressure marginal situations with centers over the British Isles (TB) and over the Mediterranean (*TwM*); (5) low pressure, either low pressure structures with centers over Central Europe (*TM*) or low pressure troughs (*TR*) and the rare but important *Vb*=situations with low pressure centers, which proceed from the Adriatic along the margin of the Alps toward Poland. Data are presented on the percent frequency in the eastern Alps of effective weather situations during the period 1948–1957, and during the different seasons, the monthly frequency and duration in days of *Vb*=situations and on the relationships between storms in all of Austria to the weather situations. *Subject Headings:* 1. Synoptic climatology of Central Europe 2. Austrian Alps. *I.L.D.*

MISCELLANEOUS

COSMIC INFLUENCES

See also: **Solar-weather relationships** (Clough), 12.1–119; **Solar effects on atmos. circulation** (Vitel's), 12.1–121.

12.1–420 551.590.21:551.506.22

Roberts, Walter Orr, **Solar-terrestrial relationships.** *American Geophysical Union, Geophysical Monograph,* No. 2:1–5, **1958.** 4 figs., 4 refs. **DLC**—The author outlines the principal known effects of the sun on the earth, lists possible solar-terrestrial effects whose relationships are not yet established conclusively, and discusses possible mechanisms by which the sun-earth effects are transmitted. The discussion includes the following: the electromagnetic radiation and corpuscular radiation of the sun; solar flares; ionospheric effects sunspot cycle effects; transmission of variable amounts of energy to the earth's upper atmosphere by thermal conduction in the solar corona, and possible terrestrial cosmic effects involving the relationship between meteoric dust and precipitation. The role of the IGY, especially the experiments of the Naval Research Laboratory in advancing knowledge of solar terrestria relations is mentioned. *Subject Headings:* **1. Solar-terrestrial relationships 2. IGY sola program.**—*I.L.D.*

12.1–421 551.590.21:551.506.22

Roberts, Walter Orr (*High Alt. Obs., Boulder, Colo.*), **Sun-earth relationships.** *America Museum of Natural History, N. Y. Hayden Planetarium, Contribution,* Ser. 1, No. 1:1–9, **1958** 3 figs. **DWB** (551 A512co)—Non-technical remarks on the solar observation program o IGY; some of the personalities among the 35 to 50 observers throughout the world, sola emissions, flares, prominences, the corona (illustr.) and some of the problems scheduled fo study during IGY in the field of solar-terrestrial relationships. *Subject Headings:* **1. Solar-terrestrial relationships 2. IGY solar program.**—*M.R.*

VISIBILITY

See also: **Visibility obs.** (Onishchenko), 12.1–42; **Satellite brightness variations** (Tsesevich), 12.1–154; **Atmos. pollution effects on visibility** (Steffens), 12.1–283; **Fog effects on visibility** (Rodewald), 12.1–379.

12.1–422 551.591:551.553:656.71(427.2

Inglis, G. A. (*Met. Office, Acklington*), **[Comment on] E. R. Thomas: Visibility and surface wind at Manchester airport and [Reply by] Thomas.** *Meteorological Magazine,* London 89(1050):24–25, Jan. **1960.** 5 refs. **DWB, DLC**—The objection raised in the comment i that a period of four or five years covered for visibility investigations is not long enough. I his reply Thomas cites the practical difficulties which make the processing of the data of a long period for the forecaster at an out station almost impossible. *Subject Headings:* **1. Visibility observations 2. Surface wind-visibility relationships 3. Airport visibility 4. Mancheste Airport, Manchester, Eng.**—*I.S.*

OPTICAL PHENOMENA

See also: **Scintillation theory of optical and radio frequency radiation** (Scheffler), 12.1–105.

12.1–423 551.593.5

Mak, A., **De groene straal waargenomen op Fuerteventura.** [The green colored flas observed on Fuerteventura.] *Hemel en Dampkring,* The Hague, 58(4):98, April **1960. DWB DLC**—On April 23, 1959 explorers at Tarajalejo visited the members of the American expedi tion at Morro del Jable and spent 3 hours on the coast taking pictures of the sunset. Immediately after the disappearing of the sun behind the Gran Canaria Mts. at 100 km from the place, a green colored flash going upward was observed. The flash was 1/10 of the sun's diameter. The phenomenon was not mentioned in the expedition report. *Subject Headings:* **1. Green flash 2. Fuerteventura, Canary Islands.**—*A.V.*

12.1–424 551.**593.53**(437.1/2)

Schindler, Gerhard, **Himmelsblau-Stufenschätzungen zu Podersam (Böhmen).** [Estimation of blue sky color gradations at Podersam, Bohemia.] *Zeitschrift für Angewandte Meteorologie,* 53(2):63–68, Feb. **1936.** 5 figs., 5 tables, foot-refs. **DWB**—Estimates of blue sky color were made by the author himself from Oct. 1934 to Nov. 1935. In order to obtain as many observations as possible these were shifted from 0700 o'clock to 1000 o'clock during Oct.–Feb. and the evening observations in May–June and July were retained at 1900 but otherwise shifted to 1600 o'clock. Tables are presented giving the total number of observations of Nov. 1, 1934 to Oct. 31, 1935, morning observations, noon and evening observations and monthly means of observation. The annual mean of very blue estimates at Podersam, namely 7.0 is close to that of St. Blasien for May 1929. However, the annual variation corresponds to that of Travemünde and it also has those maxima of which the principle one is in early spring. The southwest wind was associated with highest blue value, northwest and northeast winds were associated with slight blue values. *Subject Headings:* **1. Sky light color measurements 2. Podersam, Bohemia.**—*I.L.D.*

12.1–425 551.**593.55**:535.33:546.34

Gadsden, M. (*D. P. L. Auroral Station, Awarua Radio, Invercargill, New Zealand*) and Salmon, K. (*Hallett Station, Antarctica*), **Presence of 6707 A. radiation in the twilight sky.** *Nature,* London, 182(4649):1598–1599, Dec. 6, **1958.** table, 7 refs. **DWB**—A grating spectrograph at Invercargill, New Zealand, exposed on Sept. 5, 1958 to the radiation coming from the horizon and 20° altitude, on a bearing of 175° (true) showed a feeble line at 6707±2 A. "The measured wave length of this line does not correspond to that of any atomic oxygen or nitrogen line and there is no structure visible that would classify the emission as one of the molecular bands recognized in the spectra of aurorae and airglow. The twilight enhancement in a manner similar to that of sodium, occurring at approximately the same time, suggests that the line arises from the 2^2S-2^2P transition in the lithium atom (wave length 6707.8A). This line is the first member of the principal series of lithium, and thus would be excited resonantly by solar radiation in the same manner as the D-lines of sodium." On the basis of this assumption the concentration and height of the lithium atoms are estimated from the spectra. A table giving the estimates of the difference in height between the sodium and lithium layers is presented. *Subject Headings:* **1. Twilight spectra 2. Invercargill, New Zealand.**—*I.L.D.*

12.1–426 551.**593.7**

Sekigawa, T. and Sato, T. (*both, Dept. of Physics, Tokyo College of Science*), **Anomalous polarization of the light scattered from the atmosphere observed in 1955–1957.** *Meteorological Society of Japan, Tokyo, Journal, Ser.* 2, 36(5):187–192, Oct. **1958.** 10 figs., 4 refs., 2 eqs. **DWB, DLC**—Recently the fact has been published that anomalous polarization of the light scattered from above has often been observed since 1954 and in lower atmosphere. This report is to investigate several cases of anomalous polarization observed since 1955 in Tokyo, Hakone, and the top of Mt. Fuji, etc. *Subject Headings:* **1. Polarization 2. Japan.**—*Authors' abstract.*

12.1–427 551.**593.7**:551.**576**:778.3

Stănescu, C. D., **Polarizația luminii difuzată de atmosferă și diverse aplicatii ale filtrelor optice utilizate în știintă și technică.** [Polarization of atmospheric diffuse light, and various applications to filters used in science and technology.] *Meteorologia și Hidrologia,* Bucharest, 1(2):36–47, Dec. **1956.** 2 figs., 20 refs., 4 eqs. **DWB**—The physics of atmospheric polarization are explained and practical advice is given for cloud photography, especially the use of filters. *Subject Headings:* **1. Polarization 2. Cloud photography 3. Light filters.**—*G.T.*

ELECTRICAL PHENOMENA

See also: **Atmos. elec. conf.,** 12.1–2; **Ion distribution near shelter belts** (Lavrov), 12.1–61; **Electron density in F region** (Malurkar), 12.1–117; **Ionization measurement techniques** (Hok et al.), 12.1–139; **Sferics obs.,** 12.1–142; **Atmos. elec.** (Neuberger et al.), 12.1–280; **Elec. charges on drops** (Tverskaia), 12.1–376.

12.1–428 551.594.11:551.515

†Gherzi, Ernest and Keller, John E., **The electricity of the air as a weather factor.** New Orleans, La., Loyola Univ., **1959.** 26 p. fig., 2 tables, 15 refs. **DWB, DLC**—The Geophysical Observatory of Loyola University, New Orleans, Louisiana (lat 29°57′N, long 90°4′W, elevation 9.3 ft) conducted a series of tests in 1956–1959 on the electricity of air as a weather factor. Some of the results obtained are reported. These are the maiden recordings of electrical potential of the air in the southern part of U. S. and have revealed the following salient facts: the maximum electricity potential of air over the area occurs at the 19h G.M.T. wherever there are no disturbing local weather sources; it is a maximum of the potential difference between the ionosphere and the earth; it is correlated with the maximum of thunderstorm activity over the earth; and the ionosphere potential appears to be linked with some lower atmosphere weather conditions. *Subject Headings:* **1. Atmospheric potential gradient 2. Potential gradient-weather relationships.**—*N.N.*

12.1–429 551.594.11

Mühleisen, R. and Fischer, H. J., **Messung des luftelektrischen Feldes in der freien Atmosphäre.** [Measurement of the air electric field in free atmosphere.] *Naturwissenschaften,* Berlin, 47(2):36–37, Jan. 31, **1960.** fig., 2 tables, 7 refs. **DLC**—A comparison between observed electric field in volt/meter and the values calculated by GISH and by STERGIS. To make the measurement of small values with a radiosonde possible the distance between the collectors was enlarged. The accuracy of the determination of the zero during the ascension, was improved by a reversal of the measuring-system. Limits of the faults were determined. A table of values obtained by this method is given. There is a general agreement with the values of GISH and STERGIS even to 32 km. The measurement of potential differences between earth and ionosphere can be limited to the determination of the field till the tropopause. An extrapolation with accuracy for the stratosphere is possible. *Subject Headings:* **1. Atmospheric electricity 2. Atmospheric electricity measurement in upper atmosphere 3. Potential gradient between earth and ionosphere.**—*A.V.*

12.1–430 551.515.3:551.594.21

†Vonnegut, Bernard (*Arthur D. Little, Inc., Camb., Mass.*), **Electrical theory of tornadoes.** *Journal of Geophysical Research,* Wash., D. C., 65(1):203–212, Jan. **1960.** 3 figs., 43 refs., 8 eqs. **DWB, DLC**—Modern theory and observations appear to support the very old and almost forgotten idea that tornadoes are a manifestation of thunderstorm electricity. It is suggested that there is sufficient electrical energy in an intense thunderstorm to power a tornado and that the electrification could cause extraordinarily intense winds by electrically heating air or by accelerating charged air in an electric field. *Subject Headings:* **1. Thunderstorm electricity 2. Tornado theories.**—*Author's abstract.*

12.1–431 551.594.221:551.576.1

†Kitagawa, N. and Brook, M. (*New Mexico Inst. of Mining and Technology, Socorro, N. M.*), **A comparison of intracloud and cloud-to-ground lightning discharges.** *Journal of Geophysical Research,* Wash., D. C., 65(4):1189–1201, April **1960.** 14 figs., table, 21 refs. **DLC**—Lightning discharges were investigated with high time-resolution equipment on both electric-field and electric-field-change meters. The analysis of the electrical records reveals that the late stages of intracloud discharges are very similar to those of cloud-to-ground discharges during the periods between successive return strokes (junction process) and during the period after the last return stroke (final process). In contrast, the initial portion of the field change of an intracloud discharge bears little or no resemblance to the initial portion of the leader field change of a discharge to ground. It is suggested that the difference in the initial breakdown characteristics results from variations in the relative populations of water drops

and ice particles as they affect the internal impedence of the region of cloud where breakdown occurs. The difference in the initial field-change characteristics of intracloud and cloud-to-ground discharges is so distinct that from the first 10 msec of the electric-field-change record one can predict with over 95 per cent certainty whether a discharge will reach ground or remain within the cloud. *Subject Headings:* **1. Lightning discharges 2. Cloud-to-ground lightning.**—*Authors' abstract.*

12.1–432 551.594.221:551.515.4

Brook, M. and Kitagawa, N. (*New Mexico Inst. of Mining and Technology, Socorro, N. M.*), **Some aspects of lightning activity and related meteorological conditions.** *Journal of Geophysical Research*, Wash., D. C., 65(4):1203–1210, April 1960. 6 figs., 2 tables, 14 refs. **DLC**—Lightning statistics are used to define a thunderstorm activity index. The index is based upon (1) the total duration and (2) the frequency of occurrence of lightning discharges. It is suggested that the horizontal extent of a storm may be inferred from the shape of the frequency-distribution curve, whereas the mean duration of discharges is related to the vertical convective activity. The bipolar thunderstorm mode of HOLZER and SAXON is extended to account for the occurrence of multiple discharges to ground. A relationship between the number of intracloud discharges and the total number of separate return strokes in ground discharges may be predicted from the model. Good agreement is found with the predictions in some, but not all storms. Statistics are cited which suggest that the ratio of intracloud to cloud-to-ground discharges may reflect the type of storm (e.g., 'frontal' or 'local air mass'). *Subject Headings:* **1. Lightning statistics 2. Thunderstorm activity.**—*Authors' abstract.*

12.1–433 551.594.221(497.2)

Todorov, K. D., **Interesnyĭ vid molnii.** [A curious type of lightning.] *Priroda*, Moscow, 47(2):116, Feb. 1958. fig. **DLC**—A description, with the aid of a diagram, of an unusual lightning discharge observed in the fall of 1956, at Varna, Bulgaria. After heavy rain large lightning flashes appeared in the west. After proceeding some distance they separated into two branches, one of which was shaped like a spiral and extended vertically; while the other continued along the original path. *Subject Headings:* **1. Lightning forms 2. Varna, Bulgaria.**—*I.L.D.*

12.1–434 551.594.221:535.33

Wallace, L. (*Yerkes Obs., Univ. of Chicago*), **Note on the spectrum of lightning in the region 3670 to 4280 A.** *Journal of Geophysical Research*, Wash., D. C., 65(4):1211–1214, April 1960. fig., 2 tables, 12 refs. **DLC**—Examination of the near-ultraviolet lightning spectrum has revealed the presence of the CN violet bands and a large number of unidentified features in addition to confirming most of the previous identifications. *Subject Heading:* **1. Lightning spectrum.**—*Author's abstract.*

12.1–435 551.594.221

Workman, E. J.; Brook, M. and Kitagawa, N. (*all, New Mexico Inst. of Mining & Tech., N. Mexico*), **Lightning and charge storage.** *Journal of Geophysical Research*, Wash., D. C., 65(5):1513–1517, May 1960. 2 figs., table, 9 refs. **DLC**—An unusual lightning flash consisting of a record 54 current surges, of which 26 were leader-return-stroke combinations, and having a total duration of 2 seconds, is described. The character of the lightning flash evidences a charge configuration of large extent, thought to consist of from 4 to 6 thunderstorm cells simultaneously active. The electric and photographic evidence indicates path lengths of approximately 9 km (30,000 ft) for the final strokes of the flash. *Subject Heading:* **1. Lightning flashes.**—*Authors' abstract.*

12.1–436 |551.594.253:551.574.41

Magono, Choji and Takahashi, Tsutomu, **On the electrification of dew by water droplets.** *Sapporo, Japan. Hokkaido University. Faculty of Science, Journal, Series 7, Geophysics*, 1(2):69 79, Nov. 1958. 7 figs., table, 9 refs. **DLC**—It was observed that frost produced artificially on a thin wire was electrified, but no steady regularity in the polarity was found in the electrification phenomena. Later, by more careful experiments it was noted that dew produced by almost the same method as the frost making method was electrified negatively when the water temperature of the reservoir for the supply of water vapor was lower than about 80°C and positively when the temperature was higher than about 85°C. The electrification phenomena of the dew or the frost were considered to have originated from the electric charge on individual water droplets, because it was observed that the droplets were electrified at the time when they rose from the water surface of the reservoir, and the sign of charge on the individual droplets agreed well with that of the dew. *Subject Headings:* **1. Electrical properties of dew 2. Electrical charges on drops.**—*Authors' abstract.*

12.1–437 551.594.253:551.578.11:551.574.1

Makhotkin, L. G. and Solov'ev, V. A., **O roli elektricheskikh zariadov pri koaguliatsii kapel' tumana.** [Role of electric charges in the coagulation of fog drops.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 73: 116–122, **1958.** 3 figs., table, 16 refs., 7 eqs. **DLC**—Various studies on the role of the electric charge of drops in repulsion and coalescence are summarized, in particular the work of Cochet on the coagulation of large charged drops falling through small neutral droplets; this showed that coagulation is extremely effective for particular parameters. In verifying the method of computing coefficients, Cochet compared computed and experimental drop trajectories near a charged cylinder. Formulas for computing the coefficient of drop capture, $\ni$ are derived. The size distribution of drop of natural figures, the rate of fall of drops and the coefficient of capture of charged drops are discussed. *Subject Headings:* **1. Fog drops 2. Drop coagulation 3. Electrical charges on drops.**—*I.L.D.*

ACOUSTICAL PHENOMENA

See: **Acoustical propagation in sea (Ivanov, *transl.*), 12.1–189.**

12.1–438 551.596.1:534:629.13

Maglieri, Domenic; Hubbard, Harvey H. and Lansing, Donald L., **Ground measurements of the shock-wave noise from airplanes in level flight at Mach numbers to 1.4 and at altitudes to 45,000 feet.** *U. S. National Aeronautics and Space Administration, Technical Note,* D-48, Sept. **1959.** 38 p. diagrs., photos, tables. Price: $1.00. **DWB, DLC**—Time histories of noise pressures near ground level were measured at several locations during high-altitude flights of fighter-type airplanes over fairly flat, partly wooded terrain. Atmospheric soundings and radar-tracking studies were obtained and correlated with the measured noise data. The ground noise, free-air, and reflected-wave peak overpressures are presented and are compared with available theory. In addition, some physiological and physical phenomena associated with specific values of the peak overpressures are also described. *Subject Headings:* **1. Acoustical propagation 2. Shock wave observation techniques 3. High altitude flights.**—*Authors' abstract.*

PART II. BIBLIOGRAPHY ON AURORA

Compiled by: Andrew J. Meglis

INTRODUCTION

Since the publication of the last bibliography on aurora in March, 1954 a vast amount of material on the subject has accumulated in our files from projects such as those carried out within the framework of IGY, which have added much to our knowledge of aurora and its mechanisms, as well as to the volume of literature. The 500 items accumulated have been divided into two parts: first, the general or descriptive aspect of auroras, and second, the physics and chemistry. Auroral physics has been included in this bibliography only when incidental to general studies. The bulk of the material on this phase is reserved for the second section of this two-part bibliography to be published in February.

Readers interested in additional material should consult the earlier bibliographies published in *Meteorological Abstracts* (Vol. 5, No. 3, March 1954 and Vol. 4, No. 10, Oct. 1953).

The nature of the material included herein can be determined from the Subject Outline which follows. The Geographic Outline indicates the numerous parts of the globe at which observations were made.

Appreciation is expressed for the work of Mr. Nndem Nndem who helped in searching and preparing the material in its early stages.

OUTLINE OF CONTENTS

SUBJECT OUTLINE

- General
  - **Abstracts,** 12A–103, –209
  - **Bibliographies,** 12A–84, –133, –195, –211
  - **Discussions,** 12A–24, –40, –46, –66, –73, –84, –109, –158, –179, –182, –185, –236, –245
  - **Histories,** 12A–153, –235
    - Bohemia, 12A–217
    - China, 12A–212
    - Greece, 12A–120
  - **Manuals, guides, instructions, etc.,** 12A–2, –23, –25, –46, –83, –85, –111, –144, –174, –192, –235
  - **Monographs,** 12A–246
  - **Reports, surveys, etc.,** 12A–87, –195
  - **Reviews, summaries, etc.,** 12A–31, –44, –84, –108, –234
  - **Symposia,** 12A–48
  - **Textbooks,** 12A–229
  - **IGY,** 12A–2, –17, –23, –25, –39, –42, –43, –45, –46, –48, –49, –55, –56, –68, –76, –83, –85, –98, –104, –105, –106, –107, –117, –127, –135, –158, –161, –169, –174, –185, –186, –192, –211, –218, –231, –233, –245, –249
  - **Auroral research institutes,** 12A–87
- Auroral Instruments, 12A–24, –46, –49, –66, –83, –100, –102, –107, –114, –163, –209, –232, –235
  - **Cameras,** 12A–164
    - All-sky, 12A–57, –66, –67, –132, –231
    - Boys, 12A–22
  - **Diffusion cloud chamber,** 12A–2
  - **Geiger tubes,** 12A–13, –177, –240
  - **Height-finders**
    - Clinometer, 12A–181
    - Elevometer, 12A–46, –47
    - Theodolite, 12A–111
  - **Interferometer,** 12A–166
    - Fabry-Perot, 12A–9, –10
  - **Magnetometer,** 12A–96
  - **Neutron counter,** 12A–123
  - **Photometer,** 12A–49, –93, –150, –168, –214
    - Electrophotometer, 12A–62
    - Microphotometer, 12A–115, –190
    - Photoelectric photometer, 12A–11, –12, –94
    - Photographic photometer, 12A–22
  - **Photomultiplier,** 12A–37, –96
  - **Radar**
    - 6 m (50 Mc), 12A–143
    - 5.8 m (51.9 Mc), 12A–61
  - **Scintillation counter,** 12A–7
  - **Spectrograph,** 12A–20, –49, –55, –56, –57, –66, –114, –176, –191, –209, –244
    - Grating spectrograph, 12A–157
  - **Spectrometer,** 12A–49, –209, –220
    - Photoelectric, 12A–55
    - Photographic, 12A–22
- Auroral Physics
  - **Height,** 12A–53, –54, –64, –67, –79, –93, –94, –115, –135, –144, –145, –198, –209, –221, –228, –230, –234, –238, –248

Intensity, 12A–11, –14, –20, –54, –64, –94, –102, –115, –191, –204, –214, –250
Motions, 12A–6, –28, –30, –33, –70, –86, –101, –121, –129, –132, –135, –139, –148, –154, –159, –173
Radiation, 12A–1, –7, –14, –63, –96, –97, –151, –162, –169, –189, –216, –238
Temperature, 12A–9, –10, –56, –164, –166, –190, –191, –221
Variations
Annual, 12A–59, –206, –207, –208
Diurnal, 12A–28, –31, –59, –63, –89, –98, –106, –148, –180, –189, –224, –252
Geographic, 12A–76, –252
Seasonal, 12A–31, –153, –180, –189, –224, –252
Zones, 12A–65, –99, –239
Auroral Theories, 12A–21, –24, –28, –31, –40, –58, –75, –82, –84, –90, –101, –108, –109, –125, –127, –130, –132, –142, –149, –185, –222, –234, –236, –248
Cloud effects on auroras, 12A–146
Geomagnetism and aurora, 12A–6, –24, –28, –29, –45, –47, –65, –72, –73, –86, –91, –98, –101, –116, –117, –118, –121, –136, –155, –171, –173, –177, –194, –210, –215, –219, –234, –242
Geomagnetic micropulsations and pulsating auroras, 12A–37, –38
Solar activity and aurora, 12A–21, –29, –59, –88, –90, –95, –97, –106, –120, –153, –160, –171, –179, –180, –193, –207, –208, –224, –230, –234, –242, –247
Solar eclipse and aurora, 12A–41
Methods of Observation
Auroral photography, 12A–22, –80, –185, –231
Balloon observation, 12A–7, –123, –251
Radar studies, 12A–29, –36, –39, –50, –61, –74, –79, –126, –129, –131, –132, –140, –142, –143, –172, –173, –210, –215, –216
Radio studies, 12A–27, –33, –34, –43, –48, –74, –75, –91, –92, –100, –113, –116, –117, –118, –122, –138, –140, –141, –156, –182, –232, –238
Rocket observation, 12A–112, –240
Satellite observation, 12A–7, –43, –177, –239
Shipboard observation, 12A–15, –16, –17, –35, –200, –201
Auroral Effects on
Night airglow, 12A–52, –188, –196
Radio star scintillation, 12A–27, –117
Radio wave propagation, 12A–5, –8, –113, –163, –202, –203, –218, –226
Miscellaneous
Artificial auroras, 12A–51, –77, –149, –225
Auroral ozone, 12A–5
Doppler shift, 12A–33, –129
Line width estimation, 12A–10
Model aurora, 12A–223
Wave lengths studied or used for study (in radio or radar investigations)
X-ray, 12A–7
Microwave, 12A–132
$2–3\mu$, 12A–14
UHF
.6 m (500 Mc), 12A–97
.726 m (412.85 Mc), 12A–79
.75 m (400 Mc), 12A–129
VHF, 12A–31
1.30 m (223 Mc), 12A–27
2.816 m (106.5 Mc), 12A–74, –141
2.828 m (106.1 Mc), 12A–210
2.82 m (106 Mc), 12A–140, –142, –172
3 m (100 Mc), 12A–132
3.3 m (90.7 Mc), 12A–142
4.3 m (69 Mc), 12A–216
5.3 m (56 Mc), 12A–140, –141, –142
5.4 m (55 Mc), 12A–238
5.7 m (53 Mc), 12A–96
5.8 m (51.9 Mc), 12A–61
6 m to 9.4 m (50 to 32 Mc), 12A–75
6 m (50 Mc), 12A–95, –96, –132, –143
6.2 m (48.2 Mc), 12A–134
7.3 m (41.15 Mc), 12A–172
8 m (37.5 Mc), 12A–248
8.3 m (36 Mc), 12A–91
9.1 m (33 Mc), 12A–138
9.4 m (32 Mc), 12A–96
10 m (30 Mc), 12A–162
HF, 12A–31
10.9 m (27.6 Mc), 12A–27
11.8 m (25.4 Mc), 12A–33
12 m (25 Mc), 12A–132
17.3 m (17.31 Mc), 12A–189
20 m (15 Mc), 12A–5
23.3 m (12.86 Mc), 12A–189
25 m (12 Mc), 12A–132, –180
27.3 m (11 Mc), 12A–5
30 m (10 Mc), 12A–5, –29
37.5 m (8 Mc), 12A–5
42.7 m (7 Mc), 12A–122
46.7 m (6.42 Mc), 12A–189
MF, 12A–31
LF
11,000 m (27 Kc), 12A–71
Audio Frequency
37,500 m (8 Kc), 12A–151
400,000 m (750 cps), 12A–151
Auroral Lines Studied
Ultraviolet (20 Å–4000 Å), 12A–7, –56, –161, –165
3140 Å, 12A–13
3161 Å, 12A–13
3914 Å, 12A–12, –20, –37, –168, –221
Visible (4000–7000 Å), 12A–56, –161, –165, –178
4273 Å, 12A–183
4278 Å, 12A–20
4278 Å (OI), 12A–93, –94
5200 Å, 12A–165
5577 Å, 12A–10, –11, –12, –13, –59, –64, –93, –94, –102, –114, –150, –161, –166, –183, –243
5892 Å, 12A–59
5893 Å, 12A–243
6300 Å, 12A–59, –64, –93, –94, –150, –165, –177, –183, –197, –243
6300 Å (OI), 12A–24, –198

    - 6450 Å, 12A–93
    - 6560 Å, 12A–64
- **Infrared** (7000 Å–1 mm), 12A–56, –167, –178
    - ≥7000 Å, 12A–19
    - 7774 Å (OI), 12A–157
    - 8000–9400 Å, 12A–165
    - 8000–10,000 Å, 12A–20
    - 8446 Å, 12A–157
    - 8684–8714 Å, 12A–157
    - 9000–10,500 Å, 12A–19
    - 9800–11,200 Å, 12A–165

Description of Specific Auroras
- **Aurora australis** (1930–1954), 12A–237
- **Low latitude,** 12A–24, –32, –45, –160
- **March 22, 1920,** 12A–139
- **1946–1955**
    - March 28, 1946, 12A–237
    - Feb. 16, 1947, 12A–156
    - March 15, 1948, 12A–15
    - Feb. 20, 1950, 12A–205
    - Aug. 18–19, 1950, 12A–157
    - Sept. 25, 1951, 12A–213
    - Oct. 7, 1951, 12A–213
    - Oct. 28, 1951, 12A–213
    - Oct. 17–18, 1954, 12A–16
    - Oct. 23, 1954, 12A–16
    - Oct. 30, 1954, 12A–16
    - Nov. 2–3, 1954, 12A–16
    - Nov. 6, 1954, 12A–16
    - Nov. 23, 1954, 12A–26
    - Jan. 17–18, 1955, 12A–95
- **1956–1959**
    - Feb. 25, 1956, 12A–3, –67
    - April 21–22, 1956, 12A–230
    - Sept. 8, 1956, 12A–17, –136
    - Nov. 9, 1956, 12A–199
    - Nov. 14–15, 1956, 12A–230
    - Nov. 22–23, 1956, 12A–230
    - Jan. 21, 1957, 12A–125, –147, –175, –199
    - Jan. 28, 1957, 12A–24
    - March 10, 1957, 12A–215
    - March 26, 1957, 12A–167
    - April 10, 1957, 12A–215
    - May 9–10, 1957, 12A–18
    - Sept. 13, 1957, 12A–4, –169, –250
    - Sept. 21, 1957, 12A–169
    - Sept. 23, 1957, 12A–4, –6
    - Sept. 29, 1957, 12A–60, –186, –241
    - Sept. 30, 1957, 12A–110
    - Oct. 21–22, 1957, 12A–97
    - Feb. 10–11, 1958, 12A–150, –165, –186, –251
    - Feb. 11, 1958, 12A–4, –110, –169
    - July 8–9, 1958, 12A–147, –201
    - Aug. 1, 1958, 12A–225
    - Sept. 4, 1958, 12A–147, –242
    - Oct. 22–23, 1958, 12A–197
    - May 4–5, 1959, 12A–71
    - July 15, 1959, 12A–69
    - July 15–18, 1959, 12A–137
    - Sept. 3–4, 1959, 12A–187
    - Nov. 27–28, 1959, 12A–198
    - Nov. 28, 1959, 12A–177

GEOGRAPHICAL OUTLINE

- Antarctica, 12A–83, –86, –98, –99, –148, –248
    - **Adelie Land,** 12A–155, –208, –236, –249
    - **Heard Island,** 12A–236
    - **Mawson Island,** 12A–111
- Arctic, 12A–219
    - **Dickson Island,** 12A–72
    - **Nagursky Bay, Franz Josef Land,** 12A–72
    - **Tikhaia Bay, Franz Josef Land,** 12A–8
- Asia
    - **China**
        - Urumchi, 12A–69
        - Urungu River, 12A–69
    - **India,** 12A–105
    - **Japan**
        - Kokubunji, 12A–169
    - **U.S.S.R.** (Asiatic)
        - Yaroslavl, 12A–193
- Australasia
    - **Australia,** 12A–215, –237
        - Adelaide, 12A–250
        - Macquarie Island, 12A–111, –181, –236
        - Tasmania, 12A–207, –236
    - **New Zealand,** 12A–51, –77, –78, –146, –207, –208, –236, –237, –248
        - Campbell Island, 12A–215
        - Christchurch, 12A–215
        - Invercargill, 12A–78, –145
        - South Island, 12A–238
        - Taieri, 12A–78, –145
- Europe
    - **Czechoslovakia**
        - Bohemia, 12A–217
    - **Denmark,** 12A–203
        - Faroes, 12A–206
    - **England,** 12A–186
        - Jodrell Bank, 12A–91, –100, –116, –118, –248
    - **France,** 12A–59, –60
        - Southern France, 12A–204
    - **Germany,** 12A–194, –213
        - Altenburg, 12A–175
        - Inselsberg, 12A–175
        - Olbersdorf, 12A–175
        - Wittenberg, 12A–175
    - **Greece,** 12A–120
        - Athens, 12A–194
    - **Iceland,** 12A–205
    - **Italy**
        - Bologna, 12A–147
    - **Netherlands,** 12A–241
        - Witteveen, 12A–242
    - **Norway,** 12A–87
        - Abisko, 12A–231
        - Alvsbyn, 12A–231
        - Björnöya Islands, 12A–68
        - Malmberget, 12A–231
        - Oslo, 12A–176, –231, –244
        - Southern Norway, 12A–228

    - Spitsbergen, 12A–68, –219
    - Tromsö, 12A–68, –176, –224, –231, –244
  - **Sweden,** 12A–119
    - Kiruna, 12A–63, –162, –231
    - Lycksele, 12A–231, –232
    - Southern Sweden, 12A–231
    - Uppsala, 12A–231
  - **U.S.S.R.** (European)
    - Moscow, 12A–156, –193
    - Murmansk Oblast, 12A–193
    - Nikolsk, 12A–26
    - Sumy Oblast, 12A–193
    - Zelenogorsk, 12A–3
    - Zvenigorod, 12A–165
- NORTH AMERICA, 12A–89, –119
  - **Canada**
    - Central Canada, 12A–76
    - Alberta
      - Banff, 12A–39
    - Keewatin District
      - Baker Lake, 12A–39
      - Chesterfield, 12A–53, –54
    - Mackenzie District
      - Coppermine, 12A–53
    - Manitoba
      - Churchill, 12A–135
      - Port Churchill, 12A–200
    - Nova Scotia
      - Greenwood, 12A–75
    - Ontario
      - Chalk River, 12A–39
      - Crow River, 12A–28
      - Ottawa, 12A–28, –39, –50, –75, –95, –96, –138
    - Saskatchewan, 12A–56, –209
      - Saskatoon, 12A–31, –39, –53, –54, –115, –134, –140, –141, –191
    - West Canada, 12A–121
  - **Greenland,** 12A–224
    - Cape Farvel, 12A–155
    - Thule, 12A–155
    - Western Greenland, 12A–203
  - **Mexico**
    - Atzomoni, 12A–4
    - Guaymas, 12A–4
    - Hermosillo, 12A–4
    - Tonantzintla, 12A–150
  - **United States,** 12A–4
    - Alaska, 12A–65, –66, –67, –131
      - Anchorage, 12A–5
      - Barrow, 12A–122
      - College, 12A–11, –13, –14, –31, –33, –101, –129, –132, –172, –204
      - Fairbanks, 12A–5
      - Point Barrow, 12A–61, –132
    - California, 12A–118
      - Cactus Peak, 12A–196, –204
      - Stanford, 12A–132
    - Colorado
      - Boulder, 12A–150
    - Hawaii
      - Maui, 12A–5, –225
    - Iowa
      - Cedar Rapids, 12A–31
    - Massachusetts
      - South Dartmouth, 12A–79
    - Minnesota
      - Minneapolis, 12A–251
    - New England, 12A–64
    - New Mexico
      - Sacramento Peak, 12A–150, –196
    - New York
      - Ithaca, 12A–30, –31
    - North Dakota
      - Bismarck, 12A–5
    - Oregon
      - Corvallis, 12A–132
    - South Dakota
      - Rapid City, 12A–197
    - Texas, 12A–64
    - Virginia
      - Fredricksburg, 12A–70, –71
    - Washington, D. C., 12A–5
    - Western United States, 12A–198
  - **West Indies**
    - Cuba, 12A–4
- SOUTH AMERICA
  - **Argentina**
    - Bosque Alegre, 12A–64
  - **Chile**
    - Potrerillos, 12A–64
- PACIFIC ISLANDS
  - **Johnston Island** (U. S.), 12A–77, –149, –225
  - **Samoa**
    - Apia, 12A–225
- OCEANS AND SEAS
  - **Indian Ocean,** 12A–17
    - South Indian Ocean, 12A–136
  - **North Atlantic Ocean,** 12A–17, –224
    - Belle Isle Strait, 12A–16
  - **Sea of Azov** (U.S.S.R.), 12A–110
  - **South Pacific Ocean**
    - Bass Strait, 12A–16

12A–1 550.385.37:621.396.8:551.594.5

Aarons, J. (*Air Force, Cambridge Res. Cent.*); Gustafsson, G. and Egeland, A. (*both, Kiruna Geophys. Observ.*), **Correlation of audio-frequency electromagnetic radiation with auroral zone micropulsations.** *Nature*, London, 185(4707):148–151, Jan. 16, **1960.** 5 figs., table, 6 refs. **DWB**—There are excellent correlations between the auroral zone micropulsations and the radiation in the audio-frequency band. Two distinct frequency bands have appeared on 12% of the days for which results were obtained. This is a lower limit since on several days when the sensitivity was low, emissions were not detected. The upper-frequency band is "hiss." It varies in frequency throughout the recording period. The lower band at 750 C. P. S. for almost all the cases is steadier in frequency. Its spectral location indicates that it may well be radiation from protons, but its occasional change in frequency may make it another component of the "hiss" signals. *Subject Headings:* **1. Geomagnetic micropulsations 2. Auroral effects on radio wave propagation 3. Radio noise 4. Magnetic effects.**—*E.Z.S.* Ⓢ

12A–2 551.506.22:551.594.5

About amateur observations of the aurora during the International Geophysical Year. *Scientific American*, N. Y., 196(1):144–156, Jan. **1957.** 8 figs. (incl. photos), table. **DWB, DLC.** Also: **Mostly about making a cloud reveal the paths of nuclear particles.** *Ibid.*, 194(4):156–166, April **1956.** 5 figs. (incl. photos). **DWB, DLC**—Notes on ways in which amateurs may assist in the worldwide IGY program during 1957–8, especially in observing or photographing low latitude auroras, or in tracking the satellite. Another useful project would be to scan local records, newspapers, etc. for accounts of remarkable auroras of the past, for not half of the data on such occurrences are in the files of the auroral research centers. The second article describes an easy method of making a diffusion cloud chamber which will reveal vapor trails formed by nuclear particles or even cosmic rays. Method was described in this department in Sept. 1952. Since then 6000 amateur scientists have made these chambers. An expansion chamber (not requiring dry ice) is also described and is similar to the original and highly precise Wilson chamber which was the only one Wilson ever made. Ratio of volume in chamber before and after expansion must be between 1.25 and 1.38, preferably 1.22–1.36. (*Same item as* 9.10–37, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. IGY auroral program 3. Amateur satellite observers 4. Amateur auroral observers 5. Diffusion cloud chambers 6. Wilson cloud chamber.**—*M.R.*

12A–3 551.594.5

Abramov, R. V., **Vizul'noe nabliudenie poliarnogo siianiia v forme korony.** [Visual observation of a coronal form of aurora.] *Priroda*, Moscow, No. 12:112–113, Dec. **1959. DLC**—On Feb. 25, 1956, an intense aurora was visible in the Leningrad district. The author describes the aurora as observed at Zelenogorsk, a distance of 40 km to the northwest of Leningrad. The first signs of the aurora appeared at 19:55 o'clock. To the northeast, at an altitude of 60°, there appeared a small, oval, phosphorescent cloud and to the northwest at the same altitude, two clouds, one above the other, inclined to the horizon. The brightness of the clouds increased. The clouds shone with a greenish color. Luminescent columns began to appear and disappeared rapidly at 12:01 o'clock. The aurora attained its maximum brightness and intensity at 12:15 o'clock. Dozens of searchlight beams seemed to move across the sky with the light areas compressed above the head of the observer. At times the light columns seemed to bifurcate. Horizontal and inclined areas in the clouds were no longer visible and the entire sky (except the southern sector) was covered from horizon to zenith by an immense corona. At 20:17 o'clock the aurora began to weaken and by 20:35 o'clock the corona disappeared. A corona is observable most frequently in northern regions close to the geomagnetic pole where magnetic force lines are almost perpendicular to the surface of the earth. *Subject Headings:* **1. Auroral forms 2. Zelenogorsk, U.S.S.R.**—*I.L.D.* Ⓢ

12A–4 551.594.52:551.506.22(72)

Adem, Julián, **Auroras observed in Mexico and Cuba during the International Geophysical Year.** *International Geophysical Year, 1957/1958. Comité Nacional Mexicano, Results of the IGY in Mexico, Report,* No. 1:1–9, Dec. **1958.** 2 figs., table. **DWB** (551.06 I613re)—An aurora was observed on Sept. 13, 1957 in northern Mexico (Guaymas at 28°N, and Hermosillo at 29°N). A sketch is shown. The top of the reddish veil was at an angle of 35° and rays reached 45° above the horizon. Another was observed on Sept. 23, 1957 at many places in Cuba (orange-red to dark red) to a height of 25° above the horizon in the north. A third was seen on Feb. 11, 1958 at several places in Mexico and Cuba (a list with coordinates is included). Red and orange colors were observed in the arc which reached 45° at upper boundary in Mexico and 30° in Cuba. The same aurora was observed all over the U. S. throughout the night. In lower latitudes it started later than at high latitudes. The lowest latitude was 19°07'N at Atzomoni, Mexico. (*Same item as* 10.10–94, *Met. Abstracts.*) *Subject Headings:* **1. Low latitude auroras 2. Auroras, Mexico 3. IGY auroral program 4. Mexico 5. Cuba.**—*M.R.*

12A–5 551.594.5:551.510.62:551.510.535

†Agy, Vaughn, **Study of auroral zone attenuation of high frequency radio waves.** U. S. National Bureau of Standards. Boulder Lab., Colo., Contract IA-454, Progress Report, April 1–June 30, 1956. Also Progress Report, July 1–Sept. 30, 1956, both pub. June 14, **1957.** 2 pieces, each about 7 p. figs., 31 refs. in first report. Also called *NBS Reports,* 5089 and 5090. **DWB**—Correlation of field strength for reception of 8, 10, 11 and 15 Mc waves between Washington, D. C., Bismark, N. D., and Mani, T. H., respectively, and Anchorage and Fairbanks, respectively, is high enough to indicate that little difference exists (at least did in Sept. 1955–June 1956) between transmission

conditions over an auroral and a nonauroral path. Perhaps at times of sunspot maximum or solar flares there would be some difference in conditions over the 2 types of paths. It is concluded that amount of auroral ozone attenuation is much less than was previously supposed. (*Same item as* 9.10–304, *Met. Abstracts.*) *Subject Headings:* **1. Auroral zone attenuation of short waves 2. Ionospheric radio wave propagation.**—*M.R.*

12A–6 551.594.5:550.388.8

†Akasofu, Syun-Ichi (*Geophys. Inst., Univ. Alaska*), **Large-scale auroral motions and polar magnetic disturbances, Pt. 1, A polar disturbance at about 1100 hours on Sept. 23, 1957.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 19(1):10–25, Sept. **1960.** 13 figs., 3 tables, 54 refs., 17 eqs. **DLC**—The nature of polar magnetic disturbances associated with large-scale auroral motions is studied with particular reference to one of the remarkable magnetic and auroral events of Sept. 23, 1957. It is concluded that both the westward auroral electrojet and the eastward auroral motion are produced simultaneously by a southward electric field of order 2×10^4 e.m.u. (=20 V/km), for a moderate magnetic variation of order 550 y. It is shown that the electrojet, with duration of order 1 hr moves rapidly northward or southward. This would imply that the intensity of the electric field varies rapidly in time and place. It is inferred that the precipitation zone of high-energy electron beam varies in the same way. From these points of view, the dynamo theory is criticized and the origin of the electric field is discussed. *Subject Headings:* **1. Auroral-geomagnetic relationships 2. Auroral motions.**—*Author's abstract.* Ⓢ

12A–7 551.594.51:551.521.9

Anderson, Kinsey A. and Enemark, D. C. (*both, U. Ia., Ia. City*), **Balloon observations of X-rays in the auroral zone, Pt. 2.** *Journal of Geophysical Research*, Wash., D. C., 65(11):3521–3538, Nov. **1960.** 18 figs., table, 9 refs., 4 eqs. **DWB, DLC**—Data from a long-duration balloon flight at 35-km height over the auroral zone during Aug. 1959 showed that only very small fluxes of energetic X-rays accompany visible auroras at this latitude. The maximum observed photon flux above 25 kev during a bright aurora was 2.5 cm^{-2} sec^{-1}. Much larger fluxes, up to 40 cm^{-2} sec^{-1}, preceded two active visible displays by about half an hour. On Aug. 17 and 18 X-ray influxes were observed for several hours during the daytime. From Explorer VI data these are believed to be associated with the filling-up of the outer radiation belt after a geomagnetic storm. The scintillation counter employed permitted a determination of the X-ray energy spectrum at 6 g cm^{-2} depth from 25 to 300 kev on this and several other flights. From an analysis given here the parent electron spectrum is derived and found to be extremely steep. Typically, the ratio of the differential photon intensity at 30 kev to that at 160 kev is 350 to 1. Other balloon flights during Aug. 1959 show that a large loss of electrons having energy >25 kev is occurring even on magnetically rather quiet days. (For Pt. 1, *see* 11.10–217, Oct. 1960, *Met. Abstracts.*) *Subject Headings:* **1. Auroral radiations 2. X-radiation in auroras 3. Balloon measurements of auroras.**—*Authors' abstract.* Ⓢ

12A–8 551.510.535:551.594.5/6

†Arkhangel'skiĭ, B. F. and Pabo, N. V., **Rasprostranenie radiovoln v vysokikh shirotakh.** [Radio wave propagation in high latitudes.] *Leningrad. Arkticheskiĭ Nauchno-Issledovatel'skiĭ Institut, Trudy*, Vol. 124, **1938.** 88 p. 55 figs., 6 tables, refs. at end of each chapter. **DLC**—A very thorough treatment of all available data on Arctic troposphere and ionospheric radio propagation conditions and their disturbance by solar, magnetic, auroral and static (sferics) activity. Actual recorder records as well as derived diagrams, tables and curves are presented. Numerous references are given to the sources (mostly 1932–1937 in Russian periodicals). Theoretical considerations are not neglected but applications to study of atmosphere—especially the upper layers—and the aurora, ionosphere, terrestrial magnetism and atmospheric electricity are emphasized. The study is based on data obtained in 1932/33 and 1934/35 at Tikhaia (Calm) Bay in Franz Josef Land, and other Polar Year stations in 1932/33. (*Same item as* 51·73 and 10D–3, *Met. Abstracts.*) *Subject Headings:* **1. Radio wave propagation 2. Ionosphere 3. Tropospheric radio wave propagation 4. Sferics 5. Auroral research 6. Arctic geophysical research 7. Tikhaia (Calm) Bay, Franz Josef Land.** —*M.R.*

12A–9 551.521.326

Armstrong, E. B. (*Physics Dept., Queen's Univ., Belfast*), **The observation of line profiles in the airglow and aurora with a photoelectric Fabry-Perot interferometer.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 366–373. 4 figs., 8 refs., eqs.) **DWB**—Preliminary observations of the nightglow [OI] green line with a photoelectric Fabry-Perot interferometer are described. The temperature observed in a quiet auroral arc appeared to be in the neighborhood of 370°K. (*Same item as* 8B–135, *Met. Abstracts.*) *Subject Headings:* **1. Photoelectric observation 2. Spectral line 5577 Å [OI].**—*Author's abstract.*

12A–10 535.4:551.521.326:551.594.5

Armstrong, E. B., **Largeur de la raie OI λ5577 du ciel nocturne et des aurores.** [Width of the line OI λ5577 of the airglow and aurorae.] *Journal de Physique et le Radium*, Paris, 19(3):358–365, March **1958.** 7 figs., 2 tables, 14 refs. French and English summaries p. 358. **DLC**—Observations of the OI green line profiles in the airglow and auroras, made with a photoelectric Fabry-Perot interferometer, are described. The temperature of the region emitting the airglow radiation appears to be between 180°K and 220°K, the most likely value indicated being 190°K. Auroral regions emitting the green line appear to range in temperature from 255°K to 540°K. A method of estimating line widths from fringes to the presence of background light is described. (*Same item as* 10.1–238, Jan. 1959, *Met. Abstracts.*) *Subject Headings:* **1. Fabry-Perot interferometer 2. Airglow 3. Auroras.**—*Author's abstract.*

12A–11 551.594.51

Ashburn, Edward V., **Measurements of the specific intensities of the auroral green line at College, Alaska.** *Journal of Atmospheric and Terrestrial Physics*, 6(1):57–60, Jan. **1955.** fig., 2 tables, 3 refs. **DWB**—Measurements of specific intensities (erg/cm^2 sec sq. deg.) of auroras with a photoelectric recording photometer are described. Frequency distribution of intensities and mean intensities for different zenith distances are tabulated. Intensity ranges up to 3.8×10^{-5} for 5577 Å line and increases with zenith distance. (*Same item as* 6.7–344, *Met. Abstracts.*) *Subject Headings:* **1. Auroral spectra 2. College, Alaska.**—*C.E.P.B.*

12A–12 551.594.5:535.24

Ashburn, Edward V. (*Geophysical Inst., Univ. of Alaska, College, Alaska*), **Photometry of the aurora.** *Journal of Geophysical Research*, Wash., D. C., 60(2):205–212, June **1955.** 8 figs., table, 7 refs. **DWB**—Simultaneous measurements of the 5577A line and the 3914A line in the aurora are described. The measurements were made with a scanning photoelectric photometer. The 3914A line was present toward the north during the entire period of observation. The 3914A line usually showed a larger increase relative to the night-sky background than did the 5577A line. In a pulsating aurora, the 3914A line showed many small pulsations, whose period was 1 to 2 sec, in addition to the large pulsations. (*Same item as* 6.10–281, *Met. Abstracts.*) *Subject Heading:* **1. Auroral photometry.**—*Author's abstract.*

12A–13 551.521.326:551.594.5

Ashburn, Edward V., **Measurement of auroral radiation 3200 Å with a photon counter (Geiger tube).** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):156–157, Aug./Sept. **1956.** ref. **DWB**—Radiations on 3161 Å and 3140 Å were counted in a strong auroral display at College, Alaska. Results were satisfactory and showed that photon emission/cm^2/sec was at least 100 times that for 5577 Å airglow in middle latitudes. (*Same item as* 8.2–148, *Met. Abstracts.*) *Subject Headings:* **1. Auroral luminescence 2. College, Alaska.**—*C.E.P.B.*

12A–14 551.594.51:551.521.18(798)

Ashburn, Edward V.; Moore, J. G. and St. Amand, Pierre, **Auroral radiation to the 2 to 3 micron range.** *Journal of Geophysical Research*, Wash., D. C., 61(3):568, Sept. **1956.** **DLC**—A cooled lead-sulfide cell in a d-c bridge was used to measure radiation in the 2–3 micron range. A telescope and interference filters were used also. Auroral measurements were made near College, Alaska. Radiation from the night sky and from auroral arcs and rays with visual intensity 3 to 4 on the International Intensity Scale was less than that detectable with the instrument used. This was less than 10^{-10} "effective" watt at the lead-sulfide cell. (*Same item as* 10.4–315, *Met. Abstracts.*) *Subject Headings:* **1. Auroral radiation 2. Night airglow 3. Infrared radiation measurement techniques 4. Photoelectric cells 5. College, Alaska.**—*S. Fritz.*

12A–15 551.594.5

Aurora borealis. *Split, Yugoslavia. Hidrografski Institut Mornarice. Meteorološki Otsjek, Vremenske Prilike*, 3(1/2):49, July **1948.** **DWB**—Eye-witness reports on auroras observed from three ships (37°N, 126°W; 35°N, 66°W; 39°N, 69°W) on the morning of March 15, 1948. (*Same item as* 9.7–276, *Met. Abstracts.*) *Subject Heading:* **1. Auroral observations.**—*G.T.*

12A–16 551.594.5

Aurora [in] North Atlantic Ocean; Bass Strait. *Marine Observer*, 25(170):217–218, Oct. **1955.** **DLC**—Reports of aurora on 17–18 Oct. 1954 near Belle Isle Strait, 30 Oct. 1954 in 52°N, 51°W, 2–3 Nov. 1954 in 57–58°N, 29–39°W, 6 Nov. 1954 in 53°N, 51°W and 23 Oct. 1954 in Bass Strait. (*Same item as* 7.6–245, June 1956, *Met. Abstracts.*) *Subject Heading:* **1. Auroral observations.**—*C.E.P.B.*

12A–17 551.594.5

Aurora [in] North Atlantic Ocean [and] Hudson Bay [and] South Pacific Ocean [and] Australian waters [and] South Indian Ocean. *Marine Observer,* 27(177):145–150, July **1957.** fig. **DLC**—A number of observations of aurora are reported, mainly from N. Atlantic in 50–60°N in Sept. 1956, in practice for IGY. A remarkable sketch comes from Australian waters in 34°20′S, 114°38′E. The aurora of Sept. 8 in the Indian Ocean reached an altitude of 40° in 29°S. (*Same item as* 8.11–272, *Met. Abstracts.*) *Subject Heading:* **1. Auroras.**—*C.E.P.B.*

12A–18 551.594.5(99)

Aurora observations in Antarctica. *Sky and Telescope,* N. Y., 18(3):138–139, Jan. **1959.** figs. (incl. photos). **DWB, DLC**—Auroral photographs taken at Wilkes Station, Antarctica on July 25, 30, July 1 and May 9–10, 1957 and a spectrum of the aurora at South Pole May 9–10, 1957 is shown. Comments made by Ralph Glasgal concerning these events are included. Contains a photograph of a rayed auroral arc typical of many observed there. *Subject Headings:* **1. Auroral observations 2. Aurora australis 3. Wilkes Station, Antarctica.**—*E.Z.S.* Ⓢ

12A–19 551.594.51:546.17

Bagariatskiĭ, B. A. and Fedorova, N. I. (*Geophys. Inst., Acad. Sci. U.S.S.R.*), **Spektr poliarnykh siianiĭ v oblasti 9000–10500 Å.** [Auroral spectrum in the region 9000–10500 Å.] *Akademiia Nauk SSSR, Doklady,* 103(6):1009–1011, Aug. 21, **1955.** fig., 2 tables, 10 refs. **DLC.** Transl. by E. R. Hope issued as *Canada. Defence Research Board, T* 211 *R,* June **1955.** 3 p. fig., 2 tables, 10 refs. **DWB**—The author summarizes briefly earlier studies on the spectra in the region of longer wave lengths (7000 Å and above) and then analyzes spectra in the region 9000–10500 Å. Hydroxyl and N_2 bands were identified. (*Same item as* 8.10–299, *Met. Abstracts.*) *Subject Headings:* **1. Auroral spectra 2. Auroral nitrogen bands.**—*I.L.D.*

12A–20 551.594.51:535.33

Bagariatskiĭ, B. A., **Nekotorye dannye o raspredelenii energii v infrakrasnom spektre poliarnykh siianiĭ.** [Some data on the distribution of energy in the infrared spectrum of the polar aurora.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.* No. 4:540–542, **1957.** figs., table, 9 refs. **DLC.** Transl. into English by R. E. Daisley in the English language edition of the **Izvestiia,** *Bulletin of the Academy of Sciences of the U.S.S.R., Geophys. Series,* No. **4:149–150, 1957,** issued 1957 by American Geophy. Union.—The results of measurements of the relative intensities of infrared emission in the 8000–10,000 Å region of two auroral spectra are presented. The spectra were obtained on March 1956 with a differential spectrograph and four hourly exposures. Intensity was calculated relative to the zone of the first negative system of nitrogen $\lambda = 3914$ Å and $\lambda = 4278$ Å recorded simultaneously with infrared increases of the second order. (*Same item as* 10.4–316, *Met. Abstracts.*) *Subject Headings:* **1. Auroral spectral intensity 2. Infrared auroral emissions.**—*I.L.D.*

12A–21 551.521.326:551.594.51:551.590.21

Bagariatskiĭ, B. A., **Raboty sovetskikh uchenykh po svetimosti nochnogo neba i poliarnykh siianiĭ.** [The work of Soviet scientists on the night airglow and the polar auroras.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.,* No. **11:1410–1417, 1957.** 118 refs. **DWB.** Transl. into English in the corresponding number of the English language ed. of the **Izvestiia,** *Bulletin of the Academy of Sciences of the U.S.S.R., Geophysics Series.*—Soviet research on night airglow, twilight luminescence of the atmosphere and auroras during the past forty years is reviewed. In the 1920's, Fesenkov developed the method of "twilight photometry"; Vuks and Cherniaev in 1937 observed the fluorescence of the atmosphere in the form of sodium flashes. The role of repeated scattering in twilight phenomena, the twilight flash of oxygen lines and the explanation of the latter by the selective refraction of solar radiation in the atmosphere constitute some of the lines of study of twilight phenomena. The study of the glow of the night sky includes the development of new apparatus, research on the ultraviolet region, etc. After World War II, V. I. Krasovskiĭ investigated the infrared emission of the night sky and the mechanism of disturbance of hydroxyl glow. The energy distribution of the night sky was investigated with the aid of electrophotometers and light filters. In 1950–1952 the Institute of Terrestrial Magnetism organized in Murmansk the first station for auroral studies under the direction of S. I. Isaev. Two other stations have been established to study the relationship of auroras to solar activity. The theory of the interrelationship of solar corpuscular flux to the atmosphere and magnetic pole of the earth has been investigated by A. I. Lebedinski and others. (*Same item as* 10.6–202, June 1959. *Met. Abstracts.*) *Subject Headings:* **1. Night airglow 2. Twilight luminescence 3. Auroral-solar relationships.**—*I.L.D.*

12A–22 551.5:778.3

Baines, H. and Goddard, S. C., **Photography and meteorology, Pt. 1 2.** *Weather,* 9(2):37–41 Feb. **1954** and 9(3):74–80, March **1954.** fig., 3 photos., 23 refs. **DWB**—I. Description of Boys camera, results of lightning photography and other applications of photography to lightning research. Also cloud and whole-sky photography. II. Describes photographic photometers and spectrometers (including rocket research, auroral and night airglow spectra) and study of cosmic rays by tracks in packets of photographic plates. Several other uses are mentioned. (*Same item as* 6.3–30, *Met. Abstracts.*) *Subject Headings:* **1. Meteorological photography 2. Whole sky photography.**—*C.E.P.B.*

12A–23 551.594.51:551.506.22
Barbier, D., **L'observation visuelle des aurores pendant l'Année Géophysique.** [Visual auroral observations during the Geophysical Year.] *La Météorologie*, Paris, Ser. 4, No. 44:393–404, Oct./Dec. **1956.** figs. French, English and Spanish summaries p. 393. **DWB**—The development of an aurora is described by the author as a process taking place in three stages and the mechanism underlying the occurrence of an aurora as postulated by STÖRMER, and by CHAPMAN and FERRARO is discussed briefly. This is followed by an account of various auroras observed at lower latitudes, the importance of such auroras, the auroral program in the IGY, the participation of the WMO in the program of auroral observations during the IGY including nature of observations, auroral observation networks, observation procedure, auroral notations and position, collection of observations, etc. An outline of the procedure for making visual observations and their standardized recording is given. A series of drawings showing various types of auroras is presented. (*Same item as* 10.3–41, *Met. Abstracts.*) *Subject Headings:* **1. IGY auroral program 2. Auroral observations.**—*I.L.D.*

12A–24 551.594.52:550.388.8
Barbier, Daniel, **L'activité aurorale aux basses latitudes.** [The auroral activity at low latitudes.] *Annales de Géophysique*, Paris, 14(3):334–355, July/Sept. **1958.** 12 figs., 4 tables, 9 refs. **DLC**—Instrumentation and observations particularly concerning radiation [OI] 6300. In addition, it includes a list of auroras detected at the Observatory of Haute-Provence between March 7, 1956 and Oct. 3, 1957; distinction between active auroras and quiescent auroras; a phenomenon not described previously: the monochromatic auroral arc 6300 Å; relations between auroras and magnetic activity; frequency of the auroral activity; radiation other than [OI] 6300; and auroras at low latitudes lighted by the sun [such an aurora has been observed at Tamanrasset (lat. 22°47′)]. An abnormal phenomenon (auroral?) was observed on Jan. 28, 1957 at the Observatory of Haute-Provence. (*Same item as* 10.7–301, *Met. Abstracts.*) *Subject Headings:* **1. Low latitude auroras 2. Magnetic effects on low latitude auroras.**—*Author's abstract.*

12A–25 551.594.5:550.3:061.3
Barlow, E. W., **Aurora observations during the International Geophysical Year.** *Marine Observer*, 27(175):36–38, Jan. **1957.** **DWB**—Instructions on reporting observations on board ship. Reports of possible tropical aurora are especially needed. (*Same item as* 8.6–366, *Met. Abstracts.*) *Subject Heading:* **1. IGY aurora program.**—*C.E.P.B.*

12A–26 551.594.5
Benditskiĭ, N. D., **Poliarnoe siianie vblizi Kotlasa.** [Aurora near Kotlas.] *Priroda*, Moscow, **44**(6):116, June **1955.** **DLC**—A description of an aurora observed on Nov. 23, 1954 at Nikolsk, in the Arkhangelsk Region, between 18 and 20 h. It appeared on the northern horizon in the shape of two arches, the end of which touched the horizon. (*Same item as* 7.6–246, June 1956, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Nikolsk, Arkhangelsk Region, U.S.S.R.** —*I.L.D.*

12A–27 551.594.5:523.164.42:551.510.62
Benson, Robert F. (*Univ. Alaska*), **Effect of line-of-sight aurora on radio star scintillations.** *Journal of Geophysical Research*, Wash., D. C., 65(7):1981–1985, July **1960.** 4 figs., 5 refs. **DLC**—Evidence is presented to show that active auroral forms that pass across the line of sight to a radio star can have a direct effect of the scintillations of the signal received on a frequency of 223 Mc. This effect is most pronounced if the level of scintillation activity is relatively low before the aurora crosses the star position. Two examples are presented: in the first, an intense auroral band between the radio source in Cassiopeia (angular diameter, 4′) and the receiver disrupts the characteristic sinusoidal trace produced by the radio star signal in the output of the phase switch interferometer. This long-duration fade lasted for a period of about 8 minutes. In the second example, the aurora is accompanied by strong angular scintillation coincident with strong absorption of 27.6 Mc galactic radio waves. In both examples the radio star was within 10° of the geomagnetic zenith. *Subject Headings:* **1. Radio star scintillation 2. Auroral effects on radio stars.**—*Author's abstract.* Ⓢ

12A–28 551.501.81:551.594.5:550.375:550.385
†Bhattacharyya, B. K. (*Natl. Res. Council, Ottawa*), **Correlation studies of radio-aurora, magnetic and earth-current disturbances.** *Canadian Journal of Physics*, Ottawa, 38(5):624–637, May **1960.**

7 figs., tables, 20 refs. **DWB, DLC**—Correlation studies of the radar echo occurrence rate from aurora in half-hourly intervals at Ottawa, S and S_d components of the horizontal magnetic field H at Agincourt, and the disturbance diurnal variation of earth current at Crow River have been carried out. Short-time variations in auroral echo strength and moderate perturbations in H have also been correlated. The auroral echo occurrence rate seems to have a diurnal variation characteristic similar to that of H. It is found that auroral activity always precedes magnetic activity. The variation of the delay time between the two phenomena shows a local time dependence, being practically constant and quite small (0–15 minutes) before local midnight and increasing afterwards. This variation of the delay time appears to have a connection with reports of others regarding reversal of the direction of auroral ionization drift from west to east somewhere around midnight with subsequent magnetic perturbations which change from positive to negative. No definite conclusion could be reached regarding the relationship of earth current to other factors because of a practically random variation of cross correlation coefficients from month to month. *Subject Headings:* **1. Radio echoes from auroras 2. Auroral-geomagnetic relationships 3. Geomagnetic disturbance effects 4. Ottawa, Canada.**—*Author's abstract.* Ⓢ

12A–29 551.**501.81**:551.594.5

Birfel'd, Ia. G., **Radiolokatsionnye otrazheniia ot poliarnykh siianiĭ.** [Radar reflections from auroras.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:543–547, **1957.** 5 figs., 5 refs. **DLC.** Transl. into English by M. G. Priestley in the English language edition of the **Izvestiia,** *Bulletin of the Academy of Sciences of the U.S.S.R., Geophysics Series*, No. 4:154–158, 1957, issued **1957** by American Geophysical Union. **DWB**—Radar reflections from auroras were studied with radar having a frequency of about 10 *mh Hz* for an impulse with length of 10 mc/sec, a thickness of 75 kw in a frequency of recurrence of 50 *z*. The type of reflections obtained on the radar screen are reproduced and analyzed. In general, the reflections, although complex, consist of signals having a width of the order of 10 mc/sec corresponding to the length of the impulse studied. The reflections are associated with solar activity and geomagnetic and ionospheric disturbances produced in the ionosphere. Reflections were observed in all directions. (*Same item as* 10.8–129, *Met. Abstracts.*) *Subject Headings:* **1. Radar echoes from auroras 2. Auroras.**—*I.L.D.*

12A–30 551.594.52:551.557

Bless, R. C.; Gartlein, C. W. and Kimball, D. S. (*all, Cornell Univ., Physics Dept., Ithaca, N. Y.*), **East-west motions in the aurora.** *Astrophysical Journal*, Chicago, 122(1):205–206, July **1955.** 6 refs. **DWB, DLC**—Eastward or westward motion of auroras was noted in literature as early as 1831 (Albany) and 1837 (St. Lawrence), and in 1882–83 at least 247 instances of motion were recorded by CARLHEIM-GYLLENSKÖLD (Cape Thordsen) showing almost no dependence of motion on time. Cornell-National Geographic studies made since 1939 (Ithaca, N. Y.) show drift in 57 out of 120 displays: 45 showing westward and 22 eastward drift, while 39 showed complex motions (alternating at short intervals). On 8 instances steady motions reversed during night (10 p.m.–2 a.m.). Steady motions are usually westward early and eastward late at night, and either or both in middle of night. Random motions may occur any time but usually after an arc dissolves into rays. (*Same item as* 7.9-269, *Met. Abstracts.*) *Subject Headings:* **1. East-west auroral motion 2. Auroral drift 3. Cape Thordsen, Spitsbergen.**—*M.R.*

12A–31 551.**501.89**:551.**594.52**:551.**510.6**

†Booker, H. G.; Gartlein, C. W. and Nichols, B. (*Cornell Univ.*), **Interpretations of radio reflections from the aurora.** *Journal of Geophysical Research*, 60(1):1–22, March **1955.** 17 figs., 31 refs., eq. **DWB**—The literature on radio echoes from the aurora is reviewed and results obtained at Ithaca, N. Y., College, Alaska and Saskatoon and from analysis of radio signals transmitted from Cedar Rapids, Iowa, are analyzed. Diurnal and seasonal variations in auroral reflections correspond with frequency of auroras; maximum before and after midnight; minimum during daylight and at midnight; and, respectively, maximum at equinoxes (especially spring equinox), and minimum at solstices (especially winter solstice). Results of both pulse and continuous radio transmissions at 2.4 to 144 Mc/sec show fine structure, azimuth (always to N), fading time (proportional to frequency), which is much faster than would be expected and give clue to cause of above phenomena. Reflections are due to scattering from numerous ionized columns as in meteor trail reflections but with faster motion. Theory of ground reflection (HARANG) rejected. (*Same item as* 6.11–107, *Met. Abstracts.*) *Subject Headings:* **1. Radio echoes from auroras 2. Auroral effects on radio wave propagation.**—*M.R.*

12A–32 551.594.52:523.746

Botley, Cicely M., **Some great tropical aurorae.** *British Astronomical Association, Journal*, 67(6):188–192, July **1957.** fig., table, 9 refs. **DLC**—A number of auroral displays in low latitudes are listed, including 12 tropical. Five coincided with strong or very strong sunspot maxima. (*Same item as* 9.1–289, *Met. Abstracts.*) *Subject Heading:* **1. Low latitude auroras.**—*C.E.P.B.*

12A–33 551.594.5:551.510.12

Bowles, K. L. (*Geoph. Inst., Univ. of Alaska*), **Doppler shifted radio echoes from aurora.** *Journal of Geophysical Research,* 59(4):553–555, Dec. **1954.** fig., 5 refs. **DLC**—A brief report on observations and discoveries regarding the Doppler shift in radio echoes from the aurora using 25.4 Mc/sec C.W. or pulse signals from a 100 watt transmitter located 15 mi from a low-gain receiving antenna pointed N. The spectrum of the Doppler-shifted auroral echo and *fo* signal from transmitter obtained at College, Alaska, Oct. 24, 1954 is reproduced. Doppler shifts cannot be attributed to horizontal movements. Upwards shifts correlated with homogeneous auroral forms; (downward motion) and downward shifts with rays (upward motion). Velocities along lines of force are calculated to be about 6 km/sec which is much less than MEINEL reports obtaining from optical methods. (*Same item as* 6.8–348, *Met. Abstracts.*) *Subject Headings:* **1. Radio echoes from auroras 2. College, Alaska.**—*M.R.*

12A–34 551.594.5:551.501.81

Brown, Robert Hanbury and Lovell, A. C. B., **Radio and the Aurora borealis.** (In their: **Exploration of space by radio.** N. Y., John Wiley, **1958.** pp. 171–177. 7 figs. (incl. photos), 2 refs.) **DLC** (QB475.B7)—A brief but fairly detailed discussion of radio investigations of auroras. Radio echoes and radio noise from auroras, electron density in the auroras, interpretation of the echo structure, motion of the echo pattern, and some associated magnetic, visual and scintillation features are the topics covered. Figures and photos illustrate the ch., and references to the work of specific investigators are given in the text. *Subject Headings:* **1. Radio observation of auroras 2. Auroral observation techniques.**—*A.J.M.*

12A–35 551.506.5(98):551.594.5:551.526.6

Buinitskiĭ, V. Kh. and Efremov, A., **Predvaritel'nye nauchnye itogi dreĭfa ledokola "Sedov."** [Preliminary scientific results of the ice breaker "Sedov."] *Akademiia Nauk SSSR, Vestnik,* 10(1/2):39–50, **1940.** 2 figs. **DLC**—Brief reports on astronomical, magnetic, auroral, gravitational, bathymetrical, cryological, biological, hydrological and meteorological work of the "Sedov" (1937–39) Expedition. It is stated that auroras were observed on all but 5–6 days when the sky was not overcast. The types of meteorological observations made during the expedition are listed in detail. Cross sections of water temperature to 2500 m depth are given for E-W ("Sedov") and N-S (83°–89°N) for "Sadko," "Fram," "Sedov" and "Severnyĭ Polius" expeditions. (*Same item as* 51–109, *Met. Abstracts.*) *Subject Headings:* **1. "Sedov" Drifting Expedition, 1937–1940 2. Meteorological observations 3. Auroral observations 4. Ocean temperatures 5. Arctic Basin.**—*M.R.*

12A–36 551.594.5:551.501.81

Burkhart, K., **Radioechos am Nordlicht.** [Auroral radio echoes.] *Umschau,* 54(11):342, June 1, **1954.** 2 refs. **DLC**—Brief article on discrete and diffuse echoes. Radar echoes give the height of the auroral layer as 110 km with a range of not more than 5 km. (*Same item as* 5.8–280, Aug. 1954, *Met. Abstracts.*) *Subject Heading:* **1. Auroral radio echoes.**—*C.E.P.B.*

12A–37 551.594.5:550.385.37

Campbell, W. H. (*Geophys. Inst., Univ. Alaska*), **Micropulsations in the earth's magnetic field simultaneous with pulsating aurora.** *Nature,* London, 185(4714):677, March 5, **1960.** 2 figs. **DWB**—Two figures are given. The first illustrates the nightly coincidence of micropulsations, measured with a 6-ft diameter magnetic north axis loop antenna of 21,586 turns and 3914-Å. Auroral pulsations from 70° of sky measured with a lens, interference filter, photo-multiplier system. The second shows an occasion of simultaneous oscillations from the two phenomena. *Subject Headings:* **1. Magnetic micropulsations 2. Auroral pulsations 3. Auroral-geomagnetic relationships.**—*E.Z.S.* Ⓢ

12A–38 550.385.37:551.594.51:551.510.535:621.396.8

Campbell, Wallace H. (*Univ. Alaska*), **Magnetic micropulsations, pulsating aurora, and ionospheric absorption.** *Journal of Geophysical Research,* Wash., D. C., 65(6):1833–1834, June **1960.** fig., 2 refs. **DLC**—A relationship between magnetic field micropulsations and the pulsating aurora was reported earlier by this author. This is to note the increase in ionospheric absorption during such times of pulsations. Copies of the records are shown for comparison. *Subject Headings:* **1. Magnetic micropulsations 2. Auroral pulsations 3. Auroral-ionospheric relationships.**—*E.Z.S.* Ⓢ

12A-39 551.506.22:551.594.5 551.506.22:551.521.64

Canadian study of cosmic rays and geomagnetism. *Science and Culture*, Calcutta, 21(12):730-731, June **1956.** **DLC**—Canada's IGY program on cosmic rays includes a station at 7000 ft near Banff (geomag. lat. 50°N) and others at Chalk River, Resolute and Ottawa. Monitors for measuring neutron component of cosmic rays will be in use at the latter 3 stations and at Churchill. Aurora and airglow will be studied at 5 stations. The Soviet union will have 30 auroral and airglow stations in the U.S.S.R., 2 on the Arctic Ice Pack and 3 in Antarctica. Auroral radar will be in use at Ottawa, Baker Lake and Saskatoon. (*Same item as* 10.1-43, *Met. Abstracts.*) *Subject Headings:* **1. Canadian participation in IGY 2. IGY auroral stations 3. IGY cosmic ray stations 4. Canada 5. U.S.S.R.** —*M.R.*

12A-40 551.594.5

Castillo, Paulo, **Aurora polaris.** *Phillippines. Weather Bureau, The Elements*, 3(7):5-8, July **1952.** 8 refs. **DWB**—This article, which was written in connection with an MIT content on scientific subjects for popular reading, sums up current knowledge on auroras. The corpuscular and ultraviolet auroral theories, the height, distribution, occurrence and main forms of auroras are discussed. A description of thirteen types of auroras is added. (*Same item as* 8.3-334, *Met. Abstracts.*) *Subject Heading:* **1. Auroras.**—*G.T.*

12A-41 551.594.5:523.78

Chapman, Sydney and Stibbs, D. W. N. (*fellow, Univ. Observatory, Oxford*), **Solar eclipses and the aurora borealis.** *Alaska. University. Geophysical Institute, Contributions, Ser. B*, No. 4, **1953.** 4 figs., photos. **DWB.** Reprint from *Sky and Telescope*, N. Y., 13(2):35-39, Dec. **1953.**—In connection with plans for an observational program during and along the path of total eclipse of the sun on June 30, 1954, the authors suggest the excellent and rare opportunity which will be afforded, to determine whether or not auroras occur in midday (it is known that they occur in twilight). Also the intensity, color, and other special characteristics of the aurora can be observed if there happens to be a good display in the region of the maximum auroral frequency which is crossed for a period of several hours and a distance of 1000 miles (over North Atlantic near Greenland) by the path of totality. Chances of an aurora occurring are evaluated, and the contrast between sky brightness in total eclipse and auroral brightness and character of daytime compared to night auroras are discussed. (*Same item as* 8.3-335, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations during eclipses 2. Solar eclipse, June 1954.**—*M.R.*

12A-42 551.594.5:551.521.326:551.506.22

Chapman, S., **Aurora and airglow.** Report from Subject group IV, of International Union of Geodesy and Geophysics, at the 10th Assembly, Rome **1954.** 7 p. refs. Mimeo.—Objectives of aurora and airglow program suggested for IGY, 1957-8 are set forth and visual, photographic, spectroscopic, radio-auroral, rocket auroral and airglow measurements planned, are described in some detail. (*Same item as* 9.7-38, July 1958, *Met. Abstracts.*) *Subject Headings:* **1. Auroral investigations 2. Night airglow investigations 3. IGY auroral program.**—*M.R.*

12A-43 551.594.5:551.506.22

Chapman, Sydney, **The IGY auroral programme.** *International Geophysical Year, 1957/1958, Comité Spécial, Bulletin d'Information*, No. 7:58-61, **1956. DWB**—The objectives of auroral observations during the IGY are: an understanding of the nature of auroras, the solar emissions, the modes and periods of emissions from the sun, their courses to the earth and the ensuing luminous, electromagnetic and ionospheric processes near our earth and in the atmosphere. The immediate objective is to increase our factual knowledge of the aurora. The auroral program during this IGY included the following: the synoptic picture by photographic methods and visual surveys, alerts and special world intervals for warning information, the photometry, spectrophotometry and spectrography, the possible transfer of equipment during the months of Arctic daylight, the radio detection of aurora, the auroral radio emissions, radio absorption and scattering associated with auroras, rocket studies, atmospheric electric field, auroral sounds. The principal experiments in the ionospheric program are included. (*Same item as* 10.6-34, *Met. Abstracts.*) *Subject Heading:* **1. IGY auroral program.**—*N.N.*

12A-44 551.594.5 551.521.326

Chapman, Sydney, **Achievements and prospects in auroral and airglow research.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 1-8. 6 refs.) **DWB**—As an introduction to a symposium on aurora and airglow, the author reviews the history and problems of auroral research, namely those connected with the auroral zone, the height of auroras, their spectrum, morphology, connections with other phenomena, etc. Problems of research on airglow, zodiacal light and escape of atmospheric gases are also mentioned. (*Same item as* 8.7–335, *Met. Abstracts.*) *Subject Headings:* **1. Auroral research 2. Night airglow.**—*G.T.*

12A–45 551.594.52:550.3:061.3

Chapman, Sydney, **The aurora in middle and low latitudes.** *Nature,* London, 179(4549):7–11, Jan. 5, **1957.** 3 figs. Review by J. Paton in *World Meteorological Organization, WMO Bulletin,* 6(1):43–44, Jan. **1957. DWB**—Isochasms of Northern and Southern Hemisphere are shown and related to lines of geomagnetic latitude. Some auroras have been seen close to geomagnetic or geographical equator. Outstanding tropical auroras are listed, but the list is incomplete because observers did not realize the importance of the phenomenon. An appeal is made for tropical and subtropical observations during the IGY. An official World Prediction and Warning Center will be set up for "alert" and "special world intervals"; world-wide organization is necessary. Photos will be of great value. (*Same item as* 8.7–35, *Met. Abstracts.*) *Subject Headings:* **1. Auroral distribution 2. Low latitude auroras 3. IGY aurora program.**—*C.E.P.B.*

12A–46 551.501.1:551.594.5

Chapman, Sydney; Gartlein, C. W.; Kimball, D. S. et al., **Visual auroral observation.** *International Geophysical Year,* 1957/1958 *Annals,* Vol. 4:41–103, **1957.** 15 figs. Appendix II, **Books and articles on the aurora,** p. 91. Appendix V, **Auroral reports and others interested in auroral and airglow observation,** p. 96–98. **DWB.** Transl. into French as **Observations visuelles des aurores.** *Ciel et Terre,* Brussels, 73(11/12):546–563, Nov./Dec. **1957** and 74(1/2):48–120, Jan./Feb. **1958. DWB**—This manual includes both general information on auroras and specific instructions for their observation during the IGY. The geographic distribution of auroras is first discussed; the author distinguishes the belt of few auroras, the subauroral belt, the auroral region and the auroral cap. The observation of auroras and the equipment necessary for visual observation of auroras is then discussed. Visual observation comprises intensity (or brightness), forms, colors and height. Various types of elevometers are described, a complete classification of auroral forms is furnished, several sketches of auroras are presented, and various forms for reporting auroras are reproduced. Supplement I deals with the national auroral observers. Supplement II is a list of books and articles on auroras. Supplement III gives the geomagnetic latitudes and corresponding auroral regions for numerous countries and islands. Supplement IV discusses the methods and objectives of auroral research by means of instruments and Supplement V is a list of reporters for auroras and other persons having an interest in auroral and airglow observation and research. Supplements VI, VII and VIII deal respectively with periods favorable for the occurrence of major auroras, errors in reporting auroras, and the advantages of tabular reports over those submitted in the form of descriptive accounts. *Subject Headings:* **1. Auroral observation manuals 2. IGY auroral program 3. Visual observation of auroras. I. Paton, J. II. Schneider, O. III. Thomsen, I. L.**—*A.V.*

12A–47 551.508.96:551.594.5 551.594.5:550.385

Chapman, Sydney and Bartels, Julius, **Ein einfaches Elevometer für Polarlicht-Beobachtungen.** [A simple elevometer for auroral observations.] *Akademie der Wissenschaften, Göttingen. Mathematisch-Physikalische Klasse, Beiträge zum Internationalen Geophysikalischen Jahr,* No. 1, 3–5, 1958. Also: Bartels, J. and Chapman, S., **Eine 21-jährige Reihe erdmagnetischer Störungs-Daten, dargestellt im Hinblick auf das Auftreten von Polarlicht in niederen Breiten.** [A 21-year series of geomagnetic activity data, represented in connection with the appearance of aurora in lower latitudes.] *Ibid.,* p. 6–37. 6 figs., 2 tables. Both articles reprinted as *Alaska. Univ. Geophysical Institute, Contributions, Ser. B,* No. 24, including English translation of second article (English version of first article in *International Geophysical Year,* 1957/1958 *Annals,* Vol. 4:62–64, **1957**). **DWB**—The first paper is a description of a simple device for measuring elevation angles at night. Graduation marks are made of wood, metal or plastic on a transparent plexiglass strip so that they can be seen against the night sky. The second article contains detailed data on geomagnetic disturbances during the period 1932–1957 and probabilities of the appearance of auroras in middle latitudes deduced therefrom. *Subject Headings:* **1. Elevometers 2. Auroral-geomagnetic relationships 3. Low latitude auroras.**—*G.T.*

12A–48 551.594.5(08)

Chicago Univ. Yerkes Observatory, Williams Bay, Wisc., **Symposium on Auroral Observations during the International Geophysical Year held at Yerkes Observatory, Sept. 17–26, 1956.** Contract AF 19(122)-480, Technical Report, No. 22, **1956.** 46 p. tables, refs. "Summary of most of the papers given at the Symposium." Contents: Chamberlain, J. W., **Introduction,** p. 2. Gartlein, C. W., **Visual observation of the aurora in the Antarctic,** p. 3 (item 12A–83, this biblio.). Omholt, A., **Radio observations of aurorae,** p. 6. Glasgal, R., **Morphology of aurorae,** p. 12. Hale, D. P., **A survey of the airglow spectra,** p. 15. Landolt, A. U., **The auroral spectrum,** p. 25. Malville, M., **Solar corpuscules and the aurora,** p. 30. Schoeck, P. A., **Molecular temperatures,** p. 41. Fan,

C. Y., **Laboratory studies of auroral excitation,** p. 42. **DWB**—A symposium was held at Yerkes Observatory on Sept. 17–26, 1956 to review the observational aspects for IGY auroral observers going to the Antarctic during IGY. These observers and members of the Auroral Project at Yerkes participated in the discussion and contributed papers on visual, radio and photographic observations of the aurora and on auroral structure and physics. (*Same item as* 10.1–1, *Met. Abstracts.*) *Subject Headings:* **1. Aurora symposia 2. Antarctic auroral observation techniques 3. Auroral spectra. I. Chamberlain, Joseph W.** (*ed.*) **II. Peach, Vidya** (*ed.*).—*M.R.*

12A–49 551.594.5:551.506.22

Clark, K. C. and Romick, G. J., **An optics field site for auroral studies.** Alaska. Univ. Geophysical Institute, NSF Grant Y/1.14/177), Scientific Report No. 1 (on IGY Project No. 1.14), July **1958.** 21 p. 11 figs. **DWB** (M051 A323sc)—To serve as a guide for future users and for those who plan similar constructions, this report describes the conversion of a prefabricated walk-in refrigerator to an arctic field laboratory for optical auroral studies at the Geophysical Institute. This new facility incorporates certain specialized design features for these researches and has proven very satisfactory in its first winter season of operation. The installation and use of its present major instruments are described. This equipment includes a Hunten scanning spectrometer in a sky-scanning mount; an IGY patrol spectrograph, the College meridian mirror spectrograph, the zenith Hust prism spectrograph, and a Roach scanning photometer. Details of construction, layout, electrical circuits, and other facilities are given. (*Same item as* 10.11–266, *Met. Abstracts.*) *Subject Headings:* **1. IGY auroral program 2. Auroral observatories.**—*Authors' abstract.*

12A–50 551.501.81:551.594.5

†Collins, C., **Some observations of aurora using a low-power frequency-modulated radar.** *Canadian Journal of Physics*, Ottawa, 36(7):926–934, July **1958.** 5 figs., table, 18 refs. **DWB, DLC**—A frequency-modulated, continuous-wave radar seems to be particularly well suited to the observation of auroral ionization, since it provides both range information and a Doppler indication of radial motion. An experimental equipment of this type has been operated for a few months near Ottawa. The system parameters are briefly considered and the radar observations are compared with similar measurements made with higher-powered pulse systems. (*Same item as* 10.5–164, *Met. Abstracts.*) *Subject Heading:* **1. Radar observation of auroras.**—*Author's abstract.*

12A–51 551.594.5

Cullington, A. L. (*Dept. of Sci. & Ind. Research, Christchurch, New Zealand*), **A man-made or artificial aurora.** *Nature*, London, 182(4646):1365–1366, Nov. 15, **1958.** 2 refs. **DWB**—A report on the artificial aurora is given as observed at Apia observatory (lat. 13°48′S, long. 171°46′W). The history of such observations of Aurora australis in the tropical regions is included. This observation occurred at 1051 G.M.T. on Aug. 1, 1958. *Subject Headings:* **1. Artificial auroras 2. Aurora australis.**—*N.N.*

12A–52 551.521.326:551.594.5

Currie, B. W., **Night sky brightness at latitude 52°.** *American Geophysical Union, Transactions*, 31(4):539–540, Aug. **1950.** table, 3 refs. **DLC**—Observations of the night sky brightness at Saskatoon, Canada, lat. 52°11′N, were made under a variety of ground, atmospheric and sky conditions. They indicate that the brightness on clear nights without visible polar aurora is appreciably greater than at lower latitudes. Large differences between the average brightness for nights without apparent differences in sky and atmospheric conditions, a seasonal variation in the average brightness corresponding approximately to the seasonal occurrence of the polar aurora, and observations of sky luminosities when polar aurora is present suggest that this increase in brightness is caused by light of polar auroral origin. (*Same item as* 2.1–100 and 8B–44, *Met. Abstracts.*) *Subject Headings:* **1. Night sky brightness measurement 2. Auroras 3. Saskatoon, Canada.**—*From author's abstract.*

12A–53 551.594.52

Currie, B. W. and Weaver, J. T., **Vertical extent of auroral arcs and bands.** *Canadian Journal of Physics*, Ottawa, 35(11):611–617, Nov. **1955.** 2 figs., 8 refs. **DWB, DLC**—Measurements of the vertical extent of quiet arcs and bands from 181 auroral photographs, taken at Chesterfield (63.3°N, 90.7°W), Coppermine (67.8°N, 115.2°W), and Saskatoon (52.1°N, 106.6°W), indicate that these forms are confined to a narrow layer of the atmosphere immediately above the 100-km level. The most frequent thickness of this layer is between 20 and 40 km. Values in excess of 50 km rarely occur. The percentage of auroral time that the luminosity is restricted to this layer is uncertain. The ratio of the number of arcs and bands to the total number of observed forms suggests a value exceeding 50%. When the occurrence of each form is weighted according to the angular field covered by it, a value as high as 60% is indicated. (*Same item as* 7.8–273, *Met. Abstracts.*) *Subject Headings:* **1. Auroral heights 2. Canada.**—*Authors' abstract.*

12A-54 551.594.52

Currie, B. W., **Auroral heights over west-central Canada.** *Canadian Journal of Physics*, Ottawa, 33(12):773-779, Dec. **1955.** 2 figs., 2 tables, 11 refs. **DWB, DLC**—A complete analysis of the parallactic photographs of aurora taken at Chesterfield, N.W.T. (63.3°N, 90.7°W) in 1933 shows (a) a marked maximum in the heights of the lower limits of both homogeneous arcs and bands and auroral structures with rays between 100 and 110 km, (b) a mean height of the lower limit of arcs and bands of 108.2 km, (c) a mean height of the lower limit of auroral structures with rays of 113.4 km, (d) a decrease of height with increasing intensity and (e) no definite evidence of a change of height with time after sunset. The results suggest that heights of aurora as observed from northern Canada are slightly higher than of aurora observed from Norway. This may be due to the locations of the two regions relative to the zone of maximum auroral occurrence. No exceptionally low heights were observed at Chesterfield. Remeasurements of the 1933 photographs for Saskatoon (52.1°N, 106.6°W) indicate that one arc was definitely below the 70-km level, and possibly below the 60-km level. (*Same item as* 7.10-301, *Met. Abstracts.*) *Subject Headings:* **1. Auroral heights 2. Chesterfield, Canada.**—*Author's abstract.*

12A-55 551.594.5:551.506.22

Currie, B. W., **IGY aurora and airglow program.** *Ciencia*, Mexico City, 16(11/12):309-316, **1956.** 5 tables. **DWB**—Special problems and techniques to be used during IGY in the auroral and airglow program, a list of the 100 Western Hemisphere stations from pole to pole making or intended to make visual, photographic and photoelectric observations of auroras, a list of 23 stations to make patrol-type spectrographic observations, 12 stations to operate high resolution spectrographs and photoelectric scanning spectrometers during IGY, 13 stations to make auroral radar studies and 10 stations to make airglow observations, and a detailed account of the Canadian auroral program are included in this informative article. (*Same item as* 9.7-35, July 1958, *Met. Abstracts.*) *Subject Headings:* **1. IGY auroral program 2. Auroral networks 3. Airglow networks 4. Canada 5. Western Hemisphere.**—*M.R.*

12A-56 551.594.5:551.506.22

Currie, B. W. (*Prof. Physics, Univ. of Saskatchewan, Saskatoon, Canada*), **Upper atmospheric research.** *Boletín Bibliográfico de Geofísica y Oceanografía Americanas*, Mexico City, Vol. 1, Parte Geofísica, issued **1958.** p. 127-130. 23 refs. **DPU**—A brief review of Upper Atmosphere Research Program at the University of Saskatchewan (52°N, 106.6°W) which deals mainly with spectroscopy of the auroral, twilight and airglow emissions; with auroral-ionospheric relationships and with supervision of IGY auroral and magnetic program for west-central Canada, and analysis of resulting data. Also the University is cooperating in the auroral spectroscopy and height measurements for U. S. rocket firings at Churchill (58°N, 94°W). Spectrograph equipment is described. Results of identification in 3300 to 20,000 Å region and of incident temperature at auroral levels, height of Na layer, etc. are mentioned and a list of papers on the subjects involved appended. *Subject Headings:* **1. Auroral research 2. IGY auroral program 3. Saskatchewan, Canada.**—*M.R.*

12A-57 551.594.5(798)

Davis, T. Neil, **Brief descriptions of auroral displays over Alaska during 1957-1958.** Alaska. Univ. Geophysical Institute, Grant NSF Y/22.6/327, Scientific Report, No. 3, Jan. **1960.** 70 p. fig., ref. **DWB**—Brief working descriptions of observations using all-sky cameras and a patrol spectrograph in the northern auroral zone. Where possible, complete descriptions include universal time, magnitude and extent changes from quiet to active forms, patrol spectrographic scales, positions of radiations along the meridians. Includes a plot of nightly sums of the College K-indices and the auroral index resulting from Tryon's work. *Subject Headings:* **1. Auroral descriptions 2. Alaska.**—*E.Z.S.* Ⓢ

12A-58 551.521.326 551.594.5 551.593.55

†Dufay, Jean, **Recherches sur les phenomenes optiques de la haute atmosphère effectuees depuis 1940 à l'Observatoire de Lyon et à l'Observatoire de Haute-Provence.** [Research on the optical phenomena of the upper atmosphere since 1940 at the Observatory of Lyons and the Observatory of Haute-Provence.] *International Council of Scientific Unions, 6th Report of the Commission for the Study of Solar and Terrestrial Relationships*, pub. Orleans, **1948.** p. 144-156. 74 refs. **DWB, DLC**—Summarizes briefly works on: brilliance and color of the night sky, its polarization and the spectral composition of its light; intensity of rays of oxygen and sodium (5577, 6300 and 5892 Å); aurora; twilight phenomena; also laboratory research and theory. (*Same item as* 2.7-99 and 8B-27, *Met. Abstracts.*) *Subject Headings:* **1. Night airglow 2. Auroras 3. Twilight 4. Lyons Observatory, France 5. Haute-Provence Observatory, France.**—*C.E.P.B.*

12A-59 551.521.326:551.594.51:535.33

Dufay, Jean (*Lyons and Haute-Provence Obs.*), **Variations d'intensité des raies d'émission du ciel nocturne.** [Variations of intensity of emitted light of the night sky.] (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 51–53. 2 figs.) **DWB**—At the Lyons Observatory and the Haute-Provence Observatory 588 auroral and night sky spectrograms were obtained on 189 nights (1940–1944) and are analyzed and summarized in this paper. The diurnal and annual variations and those which correspond to solar activity are discussed and shown graphically. The 5577 Å line is strongest in all directions just after midnight; the 6300 and 5892 Å lines are strongest during the post-twilight or pre-dawn darkness. The 5577 Å line has a maximum in Oct. and a minimum in April, whereas the other two lines have maxima at winter solstice and minima at summer solstice, and for Na the difference is from 5 to 40 times the minimum values observed. The green band shows a marked 27-day cycle, but the red and yellow are indifferent to solar or magnetic activity. (*Same item as* 8B-29, *Met. Abstracts.*) *Subject Headings:* **1. Night airglow 2. Auroral spectroscopy 3. Night sky spectroscopy 4. Diurnal emission spectra variations 5. Lyons Observatory, France 6. Haute-Provence Observatory, France.**—*M.R.*

12A-60 551.594.5:535.33

Dufay, M., **Le spectre d'une aurore de basse latitude dans le visible et le proche infrarouge.** [Spectrum of a low latitude aurora in the visible and near infrared.] *Académie des Sciences, Paris, Comptes Rendus*, 245(19):1648–1650, Nov. 4, **1957.** fig., table, 5 refs. **DLC**—A low latitude aurora observed on Sept. 29, 1957, at the Haute-Provence Observatory, has presented a spectrum very rich in atomic rays. In particular were disclosed the interdicted transitions ^{1}D-^{1}S of [N II], ^{2}D-^{2}P of [O II] and ^{2}D-^{2}P of [N I]. (*Same item as* 10.1-358, *Met. Abstracts.*) *Subject Headings:* **1. Auroral spectra 2. Haute-Provence, France.**—*A.V.*

12A-61 551.501.81:551.594.5

Dyce, R. B. (*Geophysical Inst., College, Alaska and Cornell Univ., Ithaca, N. Y.*), **Auroral echoes observed north of the auroral zone on 51.9 Mc/sec.** *Journal of Geophysical Research*, Wash., D. C., 60(3):317–323, Sept. **1955.** 3 figs., 9 refs. **DLC**—During Nov. 1954, a simple radar system designed for observation of auroral echoes at 51.9 Mc/sec, was operated at Point Barrow, Alaska. Because this location is north of the accepted maximum of the auroral zone, most of the visible aurora is seen to the south of the observing station. The radar used a continuously-rotating antenna to see with equal sensitivity in all directions, but more than 90% of the echoes were obtained from directions north of east and west. Echoes were obtained only from 500 to 1100 km. These effects are explained by the theory of Moore as enlarged by Booker, Gartlein, and Nichols, requiring near-perpendicularity of radio ray paths to the lines of the earth's magnetic field. During visible aurora, propagation at 51.7 Mc/sec was investigated over an 800 km path from College to Barrow, across the auroral zone. Bursts of signal due to meteor ionization were readily observed. Propagation associated with aurora was almost nonexistent, even with visible aurora at the mid-path. If the theory of auroral echoes of Harang and Landmark were true, auroral propagation should have been readily detected. (*Same item as* 7.10-70, *Met. Abstracts.*) *Subject Headings:* **1. Radar echoes from auroras 2. College, Alaska.**—*Author's abstract.*

12A-62 551.508.93:551.594.52:535.33

Dzhordzhio, N. V., **Nekotorye rezul'taty elektrofotometricheskikh izmereniĭ poliarnykh siianiĭ.** [Some results of electrophotometric measurements of polar auroras.] *Akademiia Nauk SSSR, Izvestiia Ser. Geofiz.*, No. 5:692–695, **1957.** 6 figs., table, 4 refs., eqs. **DLC.** Transl. into English in the corresponding number of the English language ed. of the **Izvestiia**, *Bulletin of the Academy of Sciences, USSR, Geophysics Series.*—With the aid of diagrams, the author describes the construction of a universal electrophotometer for studying the illumination of the night sky and the aurora. In addition, results of measurements with this instrument are presented. These include brightness of the night sky in two spectral regions at a fixed point of the sky with coordinates $h = 21°$ and $A = 0$ distribution of the brightness of the night sky with height from the zenith to the horizon. Also equations for evaluating the errors of observation are presented. (*Same item as* 10.10-308, Oct. 1959, *Met. Abstracts.*) *Subject Headings:* **1. Auroral luminosity 2. Night sky brightness measurement techniques 3. Electrophotometry.**—*I.L.D.*

12A-63 621.396:551.594.5

Egeland, Alv; Hultqvist, Bengt and Ortner, Johannes (*all, Kiruna Geophys. Observ. Kiruna, Sweden*), **A day-time maximum of oblique auroral reflexions observed in the auroral zone.** *Nature*, London, 185(4712):519, Feb. 20, **1960.** fig., 8 refs. **DWB**—From four months records of aurorally propagated very high frequency signals taken in the auroral zone at Kiruna, a diurnal variation curve with two maxima has been found. One of these maxima is in day time between 1200 and 1600 M.E.T. The experimental points include all observed reflections. The day time echoes have the same signal characteristics observed as night echoes on the Esterline Angus records. The direction distributions for day and night maxima are approximately the same; this has been determined by means of rotary antennae. *Subject Headings:* **1. Radio reflections from auroras 2. Kiruna, Sweden.** —*E.Z.S.* Ⓢ

12A-64 551.594.52 551.521.326:535.243

Elvey, C. T. and Farnsworth, Alice H., **Spectrophotometric observations of the light of the night sky.** *Astrophysical Journal,* Chicago, 96(3):451–467, Nov. **1942.** 13 figs., 2 tables, refs., eq. **DLC**—Spectrophotometric observations of the light of the night sky have been made for the stronger lines of the visual region of the spectrum to determine (1) the variation of intensity with zenith distance to obtain a measure of the height of the auroral layer and (2) the curves of nocturnal variation of intensity. The variation of intensity with zenith distance indicates a height of 500 km for the auroral layer producing the red and green auroral lines, as well as the line of uncertain origin at λ6560. This is greater than the height obtained for the infrared radiations, 125 km. Curves of nocturnal variation of intensity were obtained at Bosque Alegre (Argentina), at Potrerillos (Chile), in the southern New England states, and at the McDonald Observatory (Univ. of Texas). The sodium line is relatively constant through the night, with enhancement at evening and morning twilights. The green auroral line is relatively constant throughout the night and through both twilights. The reported maximum near midnight has not been confirmed. The red auroral line has remarkable twilight effects, the one in the evening lasting for three or four hours after the end of twilight and the one in the morning beginning two hours before dawn. Figures show mean variations of intensity with zenith distance and nocturnal variations of intensity of the green auroral line λ5577, the red auroral line λ6300, the sodium line λ5893 and the line of uncertain origin λ6560 for Bosque Alegre, Potrerillos and the southern New England states. (*Same item as* 8B–19, *Met. Abstracts.*) *Subject Headings:* **1. Auroras 2. Auroral heights 3. Night airglow 4. Spectrophotometric observation.**—*Partly from authors' abstract.*

12A–65 551.594.52

Elvey, C. T.; Leinbach, Harold; Hessler, Joan and Noxon, John (*all, Univ. of Alaska*), **Preliminary studies of the distribution of auroras in Alaska.** *American Geophysical Union, Transactions,* 36(1):390–394, June **1955.** 3 figs., 8 refs. **DWB**—The analysis of auroral observations for 1951–53 from five stations spread over Alaska shows a zone at geomagnetic latitude 68° for which the incidence of auroras is independent of magnetic activity. At geomagnetic latitudes south of 67°, the incidence of auroras is markedly dependent upon magnetic activity. (*Same item as* 7.2–282, *Met. Abstracts.*) *Subject Headings:* **1. Auroral distribution 2. Alaska.**—*Authors' abstract.*

12A–66 551.594.5 551.521.326

Elvey, C. T. (*Dir., Geoph. Inst., Alaska Univ.*) and Roach, Franklin E. (*Nat. Bur. of Standards, Wash., D. C.*), **Aurora and airglow.** *Scientific American,* N. Y., 193(3):140–150, Sept. **1955.** photos, figs. **DWB, DLC**—In this popular review paper, the authors discuss the geographical distribution of auroras, the development of auroral displays as seen in Alaska, instruments used in investigating auroras such as the "all sky camera," spectrograph, radio and radar, magnitude of auroras, the phenomenon of "airglow," including the green light of the glow and nightglow. Nightglow maps indicating light pattern of the ray, photographs of auroral displays and breakup and a map showing the maximum frequency of the aurora are presented. (*Same item as* 8B–120, *Met. Abstracts.*) *Subject Headings:* **1. Auroras 2. Night airglow 3. Alaska.**—*I.L.D.*

12A–67 551.594.52:778.3

Elvey, C. T. (*Geophys. Inst., Univ. of Alaska*), **Problems of auroral morphology.** *National Academy of Sciences, Wash., D. C., Proceedings,* 43(1):63–75, Jan. **1957.** 7 figs., 13 refs. **DLC**—Physical processes involved in various types of auroral displays are discussed with particular reference to auroral observations made in Alaska with the help of all-sky cameras. Such cameras show the distribution of auroras over elliptical areas with axes of 1000 and 2000 km. Sample photographs and a chart showing auroral distribution over Alaska as derived from a photograph are presented. Observation of the extremely rare red arc phenomenon on Feb. 25, 1956 is described. It is suggested that different degrees of upper atmospheric ionization may account for the considerable variations of auroral heights (from 70 to over 300 km). (*Same item as* 9.8–288, *Met. Abstracts.*) *Subject Headings:* **1. Auroral photography 2. Auroral arcs 3. Auroral heights.**—*G.T.*

12A–68 551.510.535:550.3:061.3 551.506.22:551.594.5

Exploring the ionosphere. *News of Norway,* Wash., D. C., 11(41):162, Nov. 18, **1954.** **DLC**—Brief news report outlining the plans for Norwegian participation in the IGY 1957–58. The Aurora Borealis Institute at Tromsö will be the center of investigations mainly concerned with ionospheric soundings and auroral research. Other institutes will participate and new facilities will be added to those available at Spitsbergen and Björnöya (Bear) islands. (*Same item as* 6.9-22, *Met. Abstracts.*) *Subject Headings:* **1. International Geophysical Year program 2. Ionospheric soundings 3. Auroral research 4. Norway.**—*G.T.*

12A-69 551.594.5(51)

Fedorovich, B. A., **Poliarnoe siianie v Kitae.** [Aurora in China.] *Priroda*, Moscow, No. 2:105, Feb. **1960.** **DLC**—A description of an aurora observed on July 15, 1959 east of the Dzungarian plain on the bank of the Urungu River at 46°N lat and 90°20′E long at 09:30 o'clock local time the sky suddenly became red when part of the sky in the sunset region was still illuminated. Within 2-3 minutes the aurora intensified. It colored a considerable part of the sky with an extremely rich raspberry-claret hue. Bright rose colored columns then began to flash against this background. The center of the aurora was situated somewhat below the pole star, but the region of extension to the west was farther than the Great Bear and to the east farther than the Perseid constellation. The rose colored rays appeared in the southeast and then were displaced to the northwest. The combination of the dense raspberry-claret background and the bright rays lasted for 20 minutes—until 09:50 o'clock. By 10:30 o'clock there was still visible a reddish color in the sky. The aurora was visible also in Guchen, farther south at latitude 44°. At Urumchi it was not visible probably because of the atmospheric dust. The summer of 1959 was not marked by high temperatures in Sinkiang. The day following the aurora was unusual; between 11:00 and 15:40 o'clock a prevailing westerly, sultry wind was accompanied by extremely frequent and very intense gusts of scorching wind, which had not been observed once as far south as 36°N lat during a three year stay in Sinkiang. *Subject Headings:* **1. Auroral descriptions 2. China.**—*I.L.D.* Ⓢ

12A-70 551.594.51:778.3

Feibelman, W. A. (*Pittsburgh, Pa.*), **Note on auroral motion.** *Journal of Geophysical Research*, Wash., D. C., 64(1):1328-1330, Sept. **1959.** 2 figs., 2 refs. **DLC**—An aurora of moderate intensity and extent was photographed and timed. The sudden changes in auroral forms seem to agree in time with some marked changes in the Fredericksburg, Va. magnetogram. The photographs and a copy of the magnetogram are shown. *Subject Headings:* **1. Auroral forms 2. Auroral photographs 3. Auroral movement.**—*E.Z.S.* Ⓢ

12A-71 551.594.5/6

Feibelman, W. A., **Aurora of May 4-5, 1959 (No. 24).** *Journal of Geophysical Research*, Wash., D. C., 64(9):1331-1332, Sept. **1959.** 2 figs. **DLC**—The time of changes in the aurora coincides with sudden changes in the traces on the Fredericksburg Observatory magnetogram. At the same time, a recorder of 27 kc/sec signals, used locally for recording sudden enhancements of atmospherics, went off scale. On a scale of 10, this aurora would not rate above 2 in brightness. *Subject Headings:* **1. Auroras 2. Sudden enhancements of sferics.**—*E.Z.S.* Ⓢ

12A-72 551.594.5:550.384.5

Fel'dshteĭn, Ia. I. and Kirdina, E. N., **Magnitnye variatsii vnutri osnovnoĭ zony poliarnykh siianiĭ.** [Magnetic variations within the main zone of the aurora borealis.] *Problemy Arktiki i Antarktiki*, Leningrad, No. 3:118-119, **1960.** table, 3 refs. **DWB**—The study of changes in the earth magnetic pole variations was conducted in 1953 in a small region of the southern zone of the aurora borealis, particularly in reference to variations (Z) and (T). Other studies of magnetic variations were made in 1956 on Dickson island, which is also in the southern zone of the aurora borealis. The study was made at different distances from the observatory. Statistical processing of the observed data indicated that the changes in variations depends upon direction. The coefficients of correlation are the same at distances of 180 Km for latitude and 300 Km for longitude. The third study was conducted in 1957 within the zone of the aurora borealis with portable equipment at Nagursky Bay on the Franz Josef Land (80°7′N, 47°3′E). The results of analysis are discussed in the text with tabulated values of the variations (H) and (Z). *Subject Headings:* **1. Auroral zone disturbances 2. Geomagnetic variations.**—*N.P.S.* Ⓢ

12A-73 551.594.51:550.38

Ferraro, V. C. A. (*London Univ.*), **Théories des orages magnétiques et des aurores.** [Theories concerning magnetic storms and auroras.] *Ciel et Terre*, 70(9/10):345-356, Sept./Oct. **1954.** figs. **DLC**—Early history and modern concepts of geomagnetism, solar activity, magnetic storms and auroras are reviewed in a popular article, based on accurate observations and the author's theories. (*Same item as* 9.4 280, *Met. Abstracts.*) *Subject Headings:* **1. Magnetic storms theories 2. Auroral theories.**—*M.R.*

12A-74 551.594.5:621.396

Forsyth, P. A. (*Univ. of Saskatchewan*), **Radio wave reflections from aurorae.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:117-135, July **1954.** 11 figs., 17 refs. **DLC**—Radio wave reflections from auroras were reported by a number of workers including HARANG and STOFFREGEN, PIERCE, LOWELL, CLEGG and ELLYETT, and ASPINALL and HAWKINS. Such reflections have been interpreted by HERLOFSON as being due to partial reflection of the radio waves at the boundaries of the auroral structures. According to this interpretation, the electron density within an auroral structure could be as low as $4\times10^4/\mathrm{cm}^3$. Radio observations of auroras have been made at Saskatoon, Saskatchewan, for the past two years, utilizing radar equipment operating at 106.5 mc/s. Due to the nature of the apparatus used, the reflections were restricted to auroral forms located from 600 to 1100 km distant and elevated less than 7.5° above the horizon from the observing site. The auroral forms most frequently observed by the radar method were the rayed arcs and rayed bands. The auroral origin of the radio wave echoes was confirmed by comparing the radar records with photographs of the same region of the sky, both types of observations being made simultaneously. (*Same item as* 6.9–332, *Met. Abstracts.*) (*Subject Headings:* **1. Auroral reflections 2. Radio wave reflection.**—*From author's abstract.*

12A–75 **551.501.81:551.594.5**

Forsyth, P. A. and Vogan, E. L., **The frequency dependence of radio reflections from aurora.** *Journal of Atmospheric and Terrestrial Physics*, London, 10(4):215–228, **1957.** 6 figs., 10 refs., 10 eqs. **DWB**—Auroral radio reflections on 4 frequencies (32–50 Mc/s) transmitted from Greenwood, Nova Scotia, were received at Ottawa, 860 km to west. Periods of enhanced signals on one or more frequencies were often associated with auroral activity. Results are compared with those expected with various reflection mechanisms. They point conclusively to small auroral scattering centers in which ionization is sufficient to cause complete reflection, but suggest that localized absorbing regions are associated with each auroral display. (*Same item as* 8.8–126, *Met. Abstracts.*) *Subject Heading:* **1. Radio echoes from auroras.**—*C.E.P.B.*

12A–76 **551.594.52:621.396(71)**

Forsyth, P. A.; Green, F. D. and Mah, W., **The distribution of radio-aurora in central Canada.** *Canadian Journal of Physics*, Ottawa, 38(6):770–778, June **1960.** 5 figs., 2 tables, 10 refs. **DWB, DLC**—Five bistatic v.h.f. radio systems were operated in central Canada during the IGY for the purpose of detecting auroral ionization. Consistent records were obtained for a period of 5 months and these records have now been analyzed. Two types of events were detected. The nighttime (A) events occur most frequently in the auroral zone and characteristically are observed simultaneously at two points separated by about 300 km. The daytime (S) events occur simultaneously over a much larger area. The time of maximum occurrence of A events becomes later with decreasing latitude whereas the reverse is true for S events. The variation with latitude of the occurrence of A events is similar to that of other auroral phenomena. *Subject Headings:* **1. Auroral ionization 2. Radio observation of auroras 3. Canada.**—*Authors' abstract.* Ⓢ

12A–77 **551.594.51:662.2:539.1**

Fowler, P. H. and Waddington, D. C., **An artificial aurora.** *Nature*, London, 182(4651):1728, Dec. 20, **1958.** 2 refs. **DWB, DLC**—A nuclear bomb that was exploded approximately 100 mi above Johnston Island, lat. 17°S, long. 169°W, brought about some artificial auroral phenomena observed at Apia Observatory, lat. 13°S, long. 171°W. This demonstrates the possibility of producing auroras artificially. Such experiments are of great advantage in earth satellite observations and other fields. *Subject Headings:* **1. Artificial auroras 2. Nuclear explosion effects 3. Johnston Island, Central Pacific.**—*N.N.*

12A–78 **551.594.52:778.3**

*Frankpitt, B. L. and McQuistan, G. W., **Locations of the aurora australis from single station photographs.** Wellington, New Zealand. Carter Observatory, Contract AF 64(500)-1, Scientific Report, No. 3, Sept. 10, **1954.** 13 p. tables. **DWB**—This report is concerned with the method and results of analyzing single station photographic plates of auroras. The eleven plates considered were exposed from the auroral photographic stations, Invercargill and Taieri, between 1950 Aug. and 1951 Sept. The auroral forms considered are homogeneous arcs, rayed arcs and draperies. Assuming a constant height for the base of these forms, geographical coordinates for the sub-auroral points have been calculated. A discussion of the errors involved in these results, reveals that an error in the assumed height (H) of 10 km, will give an error of less than 0°.5 in (Z), the angular distance of the sub-auroral point from the station. The error in (Z) due to altitude measurement, is less than 0°.1. A brief description of each plate precedes the results obtained from it, but as yet, no deductions have been made. (*Same item as* 6.9–337, *Met. Abstracts.*) *Subject Headings:* **1. Aurora australis 2. Auroral photography 3. Auroral forms 4. New Zealand.**—*From authors' abstract.*

12A–79 **551.501.81:551.594.5**

Fricker, S. J.; Ingalls, R. P.; Stone, M. L. and Wang, S. C., (*all, Lincoln Lab., M.I.T.*), **UHF radar observations of aurora.** *Journal of Geophysical Research*, Wash., D. C., 62(4):527–546, Dec.

1957. 14 figs., 2 tables, 6 refs. **DLC**—Radar returns from aurora have been observed on a 412.85-Mc/s pulsed bistatic radar, located at South Dartmouth, Mass. Results obtained during two observational periods, 19 Sept. to 6 Oct. 1956, and 29 Nov. to 21 Dec. 1956, are given in terms of occurrence and position data, together with typical returns obtained on A-scope and range-time intensity modulated displays. Positions of observed returns are compared with positions computed on the basis of requiring beam perpendicularity to the earth's magnetic field. Indications are that returns may be obtained from regions which are 2° to 3° off perpendicular, and that returns at larger off-perpendicular angles may be limited by a height factor. The returns appear to be limited to the height range of 90 to 160 km approximately. (*Same item as* 9.7–100, *Met. Abstracts.*) *Subject Headings:* **1. Radar observation of auroras 2. UHF radar observation 3. South Dartmouth, Mass.** —*Authors' abstract.*

12A–80 551.594.5:778.3

Gadsden, M. (*Awarua Radio, Private Bay, Invercargill, New Zealand*), **Colour photography of the aurora.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 17(4):347–349, Feb. **1960.** 3 figs., 4 refs. **DLC**—Special sensitivities of the three layers making up Kodak "Ektachrome" film are such that simplifying assumptions can be made about the action of light from an aurora on them. Only one camera lens is required, the three photographs are automatically in register, a photometric wedge can be photographed on the color film directly. Successful color photographs of an aurora were obtained on 26 Oct. 1956 at St. Andrews Observatory, Scotland. *Subject Heading:* **1. Auroral photography.**—*E.Z.S.* Ⓢ

12A–81 551.594.51:546.11

Gal'perin, Iu. I., **Nabliudeniia izlucheniia vodoroda v poliarnykh siianiiakh.** [Observations of hydrogen emission in auroras.] *Astronomicheskiĭ Zhurnal*, Moscow, 34(1):131-134, Jan./Feb. **1957.** 4 figs., 2 tables, 9 refs. **DLC.** Transl. into English issued in *Soviet Astronomy AJ*, N. Y., 1(1):133–137, issued **1958.** 4 figs., etc. **DLC**—Data are given on 17 spectrograms containing H_α, taken during observations at the magnetic zenith and the magnetic horizon. Profiles of H_α have been determined from the three best spectrograms taken at the zenith. These give a maximum value of the velocity of approach of the order of 2000 km/sec. The velocity corresponding to maximum density, equals 350±100 km. *Subject Heading:* **1. Auroral hydrogen lines.**—*Author's abstract.*

12A–82 551.594.5:535.33:546.11

Gal'perin, Iu. I., **O profiliakh vodorodnykh liniĭ v spektre poliarnykh siianiĭ.** [Hydrogen line profiles in the auroral spectra.] *Astronomicheskiĭ Zhurnal*, Moscow, 35(3):382-389, May/June **1958.** 6 figs., table, 23 refs., 16 eqs. **DLC.** Transl. into English in corresponding issue of *Soviet Astronomy AJ*, New York.—Published and new data are analyzed. It is shown that H_α profiles indicate the penetration of a considerable number of protons with incident velocities of the order of 1000–2000 km/sec. It is thought that such particles cause high-altitude auroral luminescence. *Subject Heading:* **1. Auroral hydrogen lines.**—*Physics Abstracts.*

12A–83 551.594.5:551.501:551.506.22(99)

Gartlein, C. W. (*Cornell Univ.*), **Visual observation of the aurora in the Antarctic.** (In: Chicago Univ., Yerkes Observatory, Williams Bay, Wis., Contract AF 19(122)-480, Technical Report, No. 22, **Symposium on Auroral Observations during the IGY, Sept. 17–26, 1956,** pub. **1956.** p. 3–6.) **DWB**—Notes and specific instructions on coding and reporting auroras in the Antarctic at 15 min (or 1 hr) intervals during displays and directions of the geomagnetic pole from 6 stations in Antarctica. Equipment consists of an alidade, diagram card and mark sense report card. (*Same item as* 10.2–49, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observation, Antarctica 2. IGY Auroral observation instructions 3. Visual observation of auroras.**—*M.R.*

12A–84 551.594.5(98)

†Gartlein, C. W., **The aurora borealis.** (In: **Dynamic North.** Wash., D. C., Technical Assistant to Chief of Naval Operations for Polar Projects, 1956—Vol. 1, Pt. 11, **1956.** 17 p. (loose-leaf). 3 figs. (photos), 29 refs.) **DWB**—An illustrated outline summary of present knowledge of aurora borealis; structure, forms, physical characteristics, spectra, relation to other phenomena, theories, observation, photography, and a list of 29 refs. (1733–1955) to the most important works on aurora. (*Same item as* 8.4–335, *Met. Abstracts.*) *Subject Headings:* **1. Aurora borealis 2. Arctic.**—*M.R.*

12A–85 551.594.5:551.506.22

Gartlein, C. W. and Kimball, D. S. (*both, Cornell Univ.*), **Visual auroral program.** *American Geophysical Union, Transactions*, 39(3):596–701, June **1958.** 3 figs. **DWB, DLC**—After a brief sketch of the function of auroral observations (e.g., defining paths of solar emission particles in the earth's atmosphere and magnetic field) the author points out that many visual observations of aurora have been made in the past, but systematic analysis in terms of form, time, location, height, intensity, etc. has been lacking. The IGY Visual Observations Program is designed to correct the deficiencies. The use of a standard graphic card for auroral reports is outlined in detail (sample card illustrates text); card requires observation of intensity, location, motions, colors, etc. Sketches of auroral forms (e.g., rayed, flames, glow, etc.) and a synoptic map of aurora (June 30, 1957) are included. A brief discussion of the status of the auroral program concludes the article. *Subject Headings:* **1. IGY auroral program 2. Visual observation of auroras.**—*A.J.M.*

12A-86 551.594.5(99)

Gartlein, C. W.; Nack, B. et al. (*all, IGY Visual Auroral Data Center, Cornell Univ.*). **Aurora observations at the South Pole.** *American Geophysical Union, Transactions,* 40(3):288–291, Sept. **1959.** fig., table. **DWB**—There is a definite increase in the number of overhead auroras with distance from the geomagnetic pole. The southern region of maximum aurora frequency is north of NAF McMurdo and Little America, Byrd, Wilhe and the South Pole stations but inside of Ellsworth Station. Daily motion is correlated with the apparent motion of the earth's magnetic field with respect to the South Pole and the sun. When the solar angle of depression is less than 18°—the twilight effect is probably physiological—observers become unable to distinguish faint auroras and data should be treated with reserve. *Subject Headings:* **1. Polar incidence of aurora 2. Visual observation of auroras 3. Antarctica.**—*E.Z.S.* Ⓢ

12A-87 551.5(058) 55(058) 551.594.5

†**Geophysical Research in Norway, 1950/1951.** Latest issue seen **1953/1954.** Printed at Bergen, John Grieg, 1955. Annual. Issued as *Norway. Geofysiske Kommisjon, Annual Report,* No. 1, July **1950**-June **1951**; No. 2, **1951/1952**; No. 3, **1952/1953**; No. 4, **1953/1954**; No. 5, **1954/1955**; No. 6, **1955/1956**; No. 7, **1956/1957. DWB**—Each annual report summarizes the work in various branches of geophysics by 15 separate institutions or organizations and lists the 40 or 50 publications of these institutions or their scientists. Among the institutions doing auroral research are: the Institute for Theoretical Astrophysics of the Oslo Univ. (Carl Störmer), the Auroral Obs. at Tromsö (Vegard and Harang) and the Physical Institute of Oslo Univ. (Vegard and Kvifte). Meteorological research of the Norwegian Meteorological Institute (Hesselberg) and of the Geophysical Institute of Bergen Univ. (Mosby, Godske, Paulsen), the Norwegian Polar Institute (Sverdrup), the Oslo Univ. Institute for Theoretical Meteorology (Solberg) and the Institute for Weather and Climate Research of the Norwegian Academy of Science at Oslo is also cited with contributions already published and work in progress in many fields. (*Same item as* 9.10–71, *Met. Abstracts.*) *Subject Headings:* **1. Geophysical research 2. Meteorological research 3. Auroral research 4. Annual service reports 5. Bibliographies. I. Norway. Geofysiske Kommisjon.** —*M.R.*

12A-88 551.521.64:551.594.5

Gerson, N. C., **Correlation of auroras with increased cosmic ray intensities (November 19, 1949).** *Nature,* London, 167(4257):894–895, June 2, **1951.** table, 9 refs. **DWB**—A solar flare of importance 3 was observed 10.29–11.19 G.M.T., associated with considerable (up to 200%) increase of cosmic ray activity, ionospheric disturbance and many records of aurora, both Northern and Southern Hemispheres. (*Same item as* 2.11–190 and 7C–76, *Met. Abstracts.*) *Subject Headings:* **1. Auroras 2. Cosmic ray intensity 3. Solar flare effects on cosmic rays 4. Northern Hemisphere 5. Southern Hemisphere.**—*C.E.P.B.*

12A-89 551.594.53:550.38:621.396.11

Gerson, N. C., **Diurnal variation in auroral activity.** *Physical Society of London, Proceedings, Ser. B,* 68(7):408–414, July 1, **1955.** 3 figs., 19 refs. **DWB**—The variation deduced from analysis of radio contacts between amateurs in N. America (50–60° geomagnetic N) in 1949–51 by waves incident obliquely to the ionized aurora showed a strong maximum at 21 h 75th W meridian time, about the time of greatest auroral activity; 86% of the contacts fell between 17 and 24 h. The period of contact was longest in April, May and Oct. It does not seem to depend on geomagnetic control. (*Same item as* 7.2–283, *Met. Abstracts.*) *Subject Headings:* **1. Diurnal auroral variations 2. Auroral ionization.**—*C.E.P.B.*

12A-90 551.594.53:523.746

Gleissberg, W., **Vorläufige Bestimmung der mittleren Länge des 80 jährigen Sonnenfleckenzyklus.** [Preliminary determination of the mean length of the 80-year sunspot cycle.] *Naturwissenschaften,* 42(14):410, July 15, **1955.** table, 4 refs. **DWB**—From close correlation between frequency of sunspots and aurora the length of the 80-year sunspot cycle since 290 A.D. is estimated to have varied from 5–11 sunspot cycles, mean 7.1 ±0.3. Taking the mean length of the sunspot cycle is 11.1 yrs, the mean length of the 80-yr cycle is 78.8 yrs. (*Same item as* 8.8–315, *Met. Abstracts.*) *Subject Headings:* **1. Sunspot cycles 2. Auroral periodicities.**—*C.E.P.B.*

12A–91 551.594.5:551.594.12:621.396

Greenhow, J. S.; Neufeld, E. L. and Watkins, C. D. (*all, Univ. of Manchester*), **The scattering of 36 Mc/s radio waves by weak auroral ionization.** *Journal of Atmospheric and Terrestrial Physics*, London, 18(2/3):174–180, June **1960.** 3 figs., 10 refs., 2 eqs. **DLC**—Some observations of weak back-scatter echoes similar in type to the echoes associated with visual auroras are described. With an equipment of high sensitivity at a frequency of 36 Mc/s, these echoes are present to the north of Jodrell Bank (lat. 53°N, geographic; lat. 56°N, geomagnetic), for up to 30% of the observing time. The irregularities in ionization, which are aligned along the earth's magnetic field, have a length scale of 160 m and a scattering polar diagram with a width of approximately ±3°. The horizontal dimensions of the ionized regions are about 500 km along parallels of geomagnetic latitude, and 50 km at right angles to this direction. Echoes from horizontal layers of ionization, associated with the field aligned irregularities, are also observed. *Subject Headings:* **1. Radio echoes from auroras 2. Radio wave scattering.**—*Authors' abstract.* Ⓢ

12A–92 550.385.4:621.396

Hakura, Yukio and Takenoshita, Yugoro (both, *Hiraiso Radio Wave Obs. Radio Res. Labs.*), **On the short wave transmission disturbance of Feb. 11, 1958.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 12(1):10–15, **1958.** 5 figs., 3 refs. **DWB, DLC**—The storm was of unusually large scale and was accompanied with intense radio disturbance. Herein, the data obtained at Hiraiso Radio Wave Observatory are discussed and graphically presented. A fading rate counter was also used to investigate the detailed characteristics of propagation conditions. The present discussion is confined to the changes of field intensity levels and fading rates of 4 circuits, WWV, SF, WWVH and JJY. Then locations are shown on a map. The main features discussed and graphically represented are: 1) a sudden change of fading rate in WWV immediately after the onset of magnetic storm, 2) a southward shift of the fluttering fading of radio waves during the course of the magnetic storm; 3) an unusual rise of night time field intensity levels and fading rates of JJY and WWVH which coincides with the appearance of auroral echoes in the ionospheric record of vertical incidence observations. *Subject Headings:* **1. Magnetic storm effects on radio communication 2. Radio echoes from auroras.**—*I.S.*

12A–93 551.594.52

Harang, L., **Height distribution of auroral emissions.** *Journal of Atmospheric and Terrestrial Physics*, London, 9(2/3):157–159, Aug./Sept. **1956.** fig., 3 refs., 2 eqs. **DWB**—Height distributions of luminosity with a photometer are plotted. The decrease above the max at 100 km was much more rapid on 5577 and 4278 (OI lines) than on 6300 and 6450. The slope of the ratios indicates a linear decrease with height of collisional deactivation of the *D* state. (*Same item as* 8.2–323, *Met. Abstracts.*) *Subject Heading:* **1. Auroral heights.**—*C.E.P.B.*

12A–94 551.594.52:535.33

Harang, Leiv, **Height distribution of the red auroral line in polar aurorae.** *Geofysiske Publikasjoner*, Oslo, 20(5), **1957.** 9 p. 6 figs. (incl. photo), 5 refs., 2 eqs. **DLC**—Luminosity curves along vertical cross sections of auroral forms have been recorded by means of a photoelectric photometer of the lines 6300, 5577 and the band 4278. The intensity of 6300 shows a considerably slower decrease with height than the green line and the violet band. The character of the luminosity curves is demonstrated for various auroral forms. The effect is explained as due to a decrease in deactivation with height of the long-lived D state of the O atom. (*Same item as* 10.6–326, *Met. Abstracts.*) *Subject Headings:* **1. Auroral height distribution 2. Auroral spectra.**—*Author's abstract.*

12A–95 621.396.8:523.7:551.594.5

Hartz, T. R., **A solar noise outburst of January 15, 1955.** *Nature*, London, 175(4464):908–909, May 21, **1955. DWB**—A large noise outburst from the sun was recorded on 50 Mc/s at Ottawa on Jan. 15, 1955. It was followed by an intense ionospheric storm and an intense auroral display on Jan. 17–18. (*Same item as* 6.8–20, *Met. Abstracts.*) *Subject Headings:* **1. Solar radio noise 2. Auroras.**—*C.E.P.B.*

12A–96 551.594.5:621.396

Hartz, T. R.; Reid, G. C. and Vogan, E. L. (*all, Radio Physics Lab., Def. Res. Board, Shirley Bay, Ottawa, Ont.*), **V.H.F. auroral noise.** *Canadian Journal of Physics*, Ottawa, 34(7):728–729, July **1956.** fig., 6 refs. **DWB, DLC**—FORSYTH, PETRIE and CURRIE reported in 1949 noting radio frequency radiation from the aurora, though later studies failed to support such occurrence. The present report shows radio frequency (32 Mc) emissions at the time of an aurora on March 21–22,

1956. The fact that it was also noted on 50 and 53 Mc/s rules out the possibility that it was from a distant station. The signals might, however, originate from the disturbed ionosphere at the time of an aurora. On numerous other occasions similar signals or noise have been recorded at the Radio Physics Lab., Ottawa, at the time an aurora was observed visually and recorded on a magnetometer, and a photomultiplier directed at the northern sky. (*Same item as* 8.10–297, *Met. Abstracts.*) *Subject Headings:* **1. Radio frequency radiation from auroras 2. Ottawa, Ontario.**—*M.R.*

12A–97 621.396.8:551.521.9:551.594.51

Hartz, T. R., **Auroral radiation at 500 Mc.** *Canadian Journal of Physics*, Ottawa, 36(6):677–682, June **1958.** 2 figs., 14 refs. **DWB, DLC**—An observation of radio noise emissions at 500 Mc, from a type A red auroral display which occurred on Oct. 21–22, 1957, is reported. The circumstances surrounding this phenomenon are considered, and the unusual display is linked to a large flare on the sun some 30 hrs earlier. It is concluded that an unusually large particle flux for the ejected solar matter would produce sufficient ionization in local regions of the ionosphere so that auroral radio emissions would be possible. (*Same item as* 10.5–256, *Met. Abstracts.*) *Subject Headings:* **1. Auroral radiations 2. Radio noise.**—*Author's abstract.*

12A–98 551.594.5:550.385(99)

Hatherton, T. and Midwinter, G. G. (*both, Dept. of Sci. & Ind. Res., Wellington, New Zealand*), **Diurnal variation of aurora and geomagnetic disturbance at New Zealand Antarctic stations.** *Nature*, London, 184(4690), Supp. No. 12:889–890, Sept. 19, **1959.** 2 figs., table, 4 refs. **DWB**—A graphical representation of the diurnal variation of auroral incidence for Scott Base and Hallet station during the IGY is presented. Curves derived from analyses of concurrent visual and all-sky camera observations are shown separately. For the two stations the diurnal variations of auroral frequency are very similar in form. The diurnal variation of magnetic disturbance at several Antarctic stations for months March to September 1958 are also graphically represented and tabulated. The relationship between the diurnal variations of auroral incidence and local geomagnetic disturbance is discussed. *Subject Headings:* **1. Diurnal auroral variations 2. Geomagnetic disturbances 3. Auroral-geomagnetic relationships 4. Antarctica.**—*I.S.* Ⓢ

12A–99 551.594.5(99)

Hatherton, T. (*Geophysics Div., Dept. of Sci. and Ind. Res., Wellington, New Zealand*), **Geometry of the southern auroral zone and the evidence for the existence of an inner zone.** *Nature*, London, 186(4721):288–290, April 23, **1960.** 3 figs., 13 refs. **DWB**—The auroral observations at Scott Base and Hallett Station have been examined to see if there is any evidence of an inner zone inside the southern auroral zone. These stations lie between the normal zone and the predicted inner zone, and aurorae in both zones should be visible from both stations. The auroral geometry inside the southern zone appears, however, far from simple, and although an inner zone cannot be ruled out, if such a zone is present it probably has a polar distance greater than that predicted by ALFVÉN. The arc directions and the directions of minimum activity at these stations do appear, however, to be consistent with an effective zone center between the south geomagnetic and south magnetic poles and nearer the latter. Distribution of auroral activity at both stations in 1957 is compared with that at Cape Evans and Cape Adare. Histograms (12hu) show distribution of elevation of arcs on visual observations in 1958 at Scott Base. *Subject Headings:* **1. Auroral zones 2. Aurora australis 3. Antarctica.**—*E.Z.S.* Ⓢ

12A–100 551.501.81:551.594.5

Hawkins, G. S., **Observations of the aurora borealis by radio methods at the Jodrell Bank Experimental Station of the University of Manchester.** *I. U. G. G. Association of Terrestrial Magnetism and Electricity, Brussels, 1951, Transactions*, pub. **1954.** p. 229–234. 6 refs. **DWB**—The auroral displays, briefly reported in this note, were studied at Jodrell Bank by the reflection of radio energy from the associated regions of ionization. Five sets of apparatus were used each consisting of an aerial system, pulsed transmitter and receiver. The apparatus details are tabulated. Results obtained with each set are discussed and graphically represented. Photographs of echoes showing diffuse and discrete aurora on different dates are reproduced. *Subject Headings:* **1. Radio echoes from auroras 2. Jodrell Bank, Eng.**—*I.S.*

12A–101 551.594.13:551.510.535:551.594.5:550.385.4

†Heppner, James P., **A study of relationships between the aurora borealis and the geomagnetic disturbances caused by electric currents in the ionosphere.** *Canada. Defence Research Board, Report DR* 135, Oct. **1958.** 32 p. 19 figs., 18 plates, 54 refs. "Thesis, California Institute of Technology, Pasadena, 1954." **DWB**—The research reported here represents an attempt, first to find out if detailed relationships exist between aurora and magnetic disturbance, and second to organize the relationships, if found, into "patterns" which apply to a large majority, and perhaps

all of the nights on which the phenomena occur. Magnetic records and auroral observations from College (Fairbanks), Alaska, have been surveyed and graphically presented in details for the purpose. It is found that the relationships are quite definite and that practically all, if not all, disturbances may be represented in terms of two closely related patterns describing sequences of auroral activity which accompany positive and negative "bay" disturbances. Special attention is given to (1) the spatial association of aurora and electric currents, (2) a previously undescribed interval of $+\Delta H$ disturbance following negative bays, (3) auroral pulsations and movements, and (4) the repetition of similar features on consecutive nights. Theories and suggestions as to the cause of aurora and auroral zone currents are examined with reference to the present study. *Subject Headings:* **1. Auroral-geomagnetic relationships 2. Geomagnetic disturbances 3. College, Alaska.**—*I.S.*

12A-102 551.594.5:551.508.94

Hunten, D. M. (*Univ. of Saskatchewan, Saskatoon, Canada*), **Automatic auroral recorder.** *Optical Society of America, Journal*, 46(8):578–583, Aug. **1956.** 8 figs., 7 foot-refs. **DWB, DLC**—A description is given of a device which automatically sweeps the meridian once each five min. and records the intensity of the auroral green line (5577 Å) in each 10° step. It is almost completely insensitive to white light, but produces a warning signal if the white light becomes very bright. The response is roughly logarithmic over a range of 10,000 to 1 in intensity. The intensities are recorded directly and also in digital form. For the latter, five steps of intensity are distinguished and punched in paper tape; each step corresponds to a factor of 10 and the scale agrees fairly closely with the accepted International Brightness Coefficients. (*Same item as* 8.3–337, *Met. Abstracts.*) *Subject Heading:* **1. Auroral recorders.**—*Author's abstract.*

12A-103 551.510.62:551.594.7:019.941

Institute of Radio Engineers, N. Y., **Proceedings, Vol. 43, No. 11, Pt. 2, Nov. 1955, Index to abstracts and references 1946–1953.** 189 p. Author Index and Subject Index for each year, and List of Journals for years 1948–1953. **DLC**—Eight separate author indexes, 8 subject indexes and 6 journal indexes for the respective years are bound together in an excellently printed, 3 column to the page publication which, unfortunately, is almost illegible without a magnifying glass. The author indexes contain abbreviated titles and reference to abstracts. Subjects under which abstracts of interest to meteorologists may be found, include absorption; anemometer, hot wire; atmosphere; troposphere; ionosphere; microwaves, radar, wave propagation; meteorology, atmospherics; aurora; cosmic radiation; meteors; geomagnetic storms; geomagnetism; astronomy and radio; refractive index, etc. (*Same item as* 7.11–60, Nov. 1956, *Met. Abstracts.*) *Subject Headings:* **1. Abstract indexes 2. Radio wave propagation abstracts 3. Aurora abstracts.**—*M.R.*

12A-104 551.5:550.3:061.3

*International Geophysical Year, 1957/1958. Comité Spécial (CSAGI), **Second Meeting, Rome, Sept. 30–Oct. 4, 1954 [Proceedings, continued].** Its *Bulletin d'Information*, No. 5, **1955.** 79 p. tables. **DWB.** Preprint from *International Union of Geodesy and Geophysics, IUGG Bulletin d'Information, News Letter*, No. 11, **1955.**—This report lists stations in all parts of the globe, with geographical and magnetic coordinates, proposed for IGY, 1957/58, under headings of Meteorology (including ozone, radiation and spherics stations), Geomagnetism, Aurora and airglow, Ionosphere, Solar activity, Cosmic ray, Latitude and longitude, Glaciology, Oceanography, Rockets and according to Arctic, Antarctic, Equatorial, 80°–70°W, 10°E and 140°E longitude lines. In all, several thousand stations are listed. (*Same item as* 7.3–77, *Met. Abstracts.*) *Subject Headings:* **1. IGY networks 2. Station location indexes 3. Aurora observing stations.**—*M.R.*

12A-105 551.5:550.3:061.3

Third International Geophysical Year 1957–58. *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 14(4):162–163, April **1955.** **DWB**—Brief information on the enterprise is followed by an outline of the co-ordinated work program set up by the National Committee of India. The names and addresses of the members are listed. The national program is explained briefly under the following subject headings: (1) World days, (2) Meteorology, (3) Geomagnetism, (4) Airglow and aurora, (5) Ionosphere, (6) Solar activity, (7) Cosmic rays, (8) Latitudes and longitudes, (9) Glaciology and (10) Oceanography. (*Same item as* 7.3–28, *Met. Abstracts.*) *Subject Headings:* **1. International Geophysical Year, 1957–58 2. IGY auroral program 3. India.**—*W.N.*

12A-106 551.506.22:551.594.51

I. G. Y. progress report. *Institution of Electrical Engineers, Journal*, 4(42):311–312, June **1958.** fig. **DLC**—Summary of British discoveries during IGY, especially in aurora (simultaneous occurrence in N. and S. Hemisphere, proven beyond doubt by recording equipment); ionosphere, (confirmation of equatorial electro-jet at 140 km, hypothesized in 1940 by CHAPMAN and BARTELS), discovery that at times of intense solar activity a heavily ionized layer occurs just below the D layer, whereas the normal D layer remains unchanged and that solar X-ray emissions from flares produce this absorbing layer; discovery that there is diurnal variation in ion concentration even in "no sun" regions during the polar night; study of whistlers and other low frequency propagation affected by outer atmosphere, and use of solar cells in U. S. satellites. *Subject Headings:* **1. British participation in IGY 2. IGY auroral program 3. Equatorial ring current.**—*M.R.*

12A–107 551.521.326:551.594.5:551.506.22

O mezhdunarodnoĭ programme issledovaniĭ poliarnykh siianiĭ i svecheniia nochnogo neba. [International research program on auroras and night sky glow.] *Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu Mezhdunarodnogo Geofizicheskogo Goda, Informatsionnyĭ Biulleten'*, No. 3:10–18, **1957.** **DLC**—Excerpts from the resolution of the Rome conference and S. CHAPMAN's report at the Barcelona conference of the Special Committee on the IGY, outlining the international research program on auroras and night airglow. Auroral investigation was to include: 1) Division of the globe into 5 auroral regions; 2) Basic methods of investigation—(a) visual observation (organization, observation methods, equipment), (b) photographic observations, (c) photometric studies, (d) spectrographic investigations; 3) Radar observations; 4) Investigations of radio wave absorption; 5) Equipment for vertical sounding of the ionosphere; 6) Investigation by means of rockets; 7) Geomagnetic investigations; 8) Phenomena of atmospheric electricity connected with auroras; 9) Sound phenomena during auroras. A less elaborate program for night airglow research was outlined. (*Same item as* 11.1–39, Jan. 1960. *Met. Abstracts.*) *Subject Headings:* **1. IGY airglow program 2. IGY aurora program.**—*A.M.P.*

12A–108 551.594.5

Isaev, S. I., **Poliarnye siianiia.** [Auroras.] *Priroda*, Moscow, 44(9):19–27, Sept. **1955.** 4 figs., 6 plates, eqs. **DLC**—The author reviews the results of investigations on the aurora borealis that have been carried out during the past decade. The discussion includes the zone of occurrence of the aurora borealis, its height, its relationship to magnetic storms, characteristics of its spectrum, its relationship to solar phenomena, and the upper layer of the earth's atmosphere, etc. Various theories on the origin of the aurora borealis are presented. Diagrams and photographs accompany the discussion. (*Same item as* 7.6–244, June 1956, *Met. Abstracts.*) *Subject Heading:* **1. Auroras.** —*I.L.D.*

12A–109 551.594.51

†Isaev, S. I., **Novoe o prirode poliarnykh siianiĭ.** [New information on the nature of auroras.] *Problemy Severa*, Moscow, No. 1:133–148, **1958.** 6 figs., 29 refs. **DLC**—The author presents an account of the present state of the theory of auroras and discusses all recent discoveries in this field brought in by science during the last few years. *Subject Heading:* **1. Auroral theories.**—*A.M.P.*

12A–110 551.594.5

Iudin, Iu. L., **Poliarnoe siianie 11 fevralia 1958 g.** [Aurora of Feb. 11, 1958.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:38, June **1958.** **DWB, DLC**—An aurora was observed on Feb. 11, 1958, between 1730 and 1800 h (Moscow time) at the Eisk marine hydrometeorological station on the shore of Taganrog Gulf of the Sea of Azov (lat. 46°44′N). For these localities this is a rare event. Part of the horizon from northwest to north was a dark orange color. At times the color intensified and weakened. With increasing brightness the color extended almost to the zenith. A narrow band of altostratus clouds was observed at the line of the horizon. An aurora was observed at this station also on Sept. 30, 1957 between 2000 and 2300 h. (*Same item as* 10.8–359, *Met. Abstracts.*) *Subject Headings:* **1. Aurora of Feb. 1958 2. Sea of Azov.**—*I.L.D.*

12A–111 551.508.9:551.594.5

Jacka, F. and Ballantyne, J., **Instruments and methods for auroral observation.** *Australian National Antarctic Research Expeditions, Interim Reports*, No. 11, Nov. **1955.** 35 p. 10 figs. (incl. photos), 2 refs. **DWB**—Instruments and methods of auroral observation at Macquarie (61°S geomag.) and Mawson (73°S) used by personnel in ANARE expeditions are set forth in this manual. Identification of forms, estimation of intensity, description of occurrence, accuracy of direction measurements, timing, sketching, etc., are first outlined and then a simple open sight theodolite for measuring azimuth and elevation of any point on an aurora to 0.1° in about 5 sec, is described in detail and illustrated. Care and testing are also covered. The theodolite was used successfully at Macquarie Island. A photo theodolite, accurate to 1 min, is also described at length and illustrated and the details shown schematically. Two have been used for a year at Macquarie Island. (*Same item as* 9.1–146, *Met. Abstracts.*) *Subject Headings:* **1. Auroral instruments 2. Auroral observations 3. Macquarie Island.**—*M.R.*

12A-112 551.507.362.1:551.594.5

Jackson, J. E. and Seddon, J. C. (*both, Natl. Aeronautics & Space Admin., Wash., D. C.*), **Rocket measurements through an aurora.** *American Geophysical Union. Transactions*, 40(4):381-384, Dec. **1959.** fig. **DWB, DLC**—The report describes the experiment and summarizes the results obtained after the launching of an instrumented Aerobee Hi rocket into an overhead aurora. The observations showed that the aurora produces dense cores of ionization along the lines of force of the earth's magnetic field. Electron densities greater than 10^6/cm^3 were measured in the E region of the ionosphere. *Subject Headings:* **1. Aerobee Hi rockets 2. Rocket measurement of auroral radiation 3. Auroral research with rockets.**—*E.K.* Ⓢ

12A-113 523.164.83:551.594.5

James, J. C.; Bird, L. E.; Ingalls, R. P. et al., **Observed characteristics of an ultra-high frequency signal traversing an auroral disturbance.** *Nature*, London, 185(4712):510 512, Feb. 20, **1960.** 3 figs. **DWB**—An experimental study was made to determine the characteristics of ultra-high-frequency signals propagated through auroral type disturbances. The experiment was performed by illuminating the moon from a site in the auroral zone and receiving the reflected signals from the moon at two sites in mid-latitudes. Each site used an antenna having two orthogonal polarizations. It was found that an auroral disturbance in the path of propagation causes a rapid fluctuation in the polarization angle of the signal received, and an increase in the rate of fading of the signal received, but no measurable absorption of the signal itself. The observed rapid changes in polarization angle are probably due to changes of electron content of the ionosphere of the order of 10^{-17} electrons in a vertical column of 1 sq m cross section. *Subject Headings:* **1. Auroral effects on radio wave propagation 2. Radio echoes from moon. I. Stone, M. L. II. Day, J. W. B. III. Lockwood, G. E. K.**—*E.Z.S.* Ⓢ

12A-114 551.508.9:551.594.51

Jones, A. Vallance and Gush, Herbert, **Auroral and night sky exposure register.** *Review of Scientific Instruments*, 25(9):928, Sept. **1954.** fig. **DLC**—A circuit diagram is presented and description furnished of a photoelectric device to be used for correct exposure in auroral spectral photography. Light from the auroral green line (isolated by an interference filter) is focused, by means of an objective lens, on a photomultiplier; the photocurrent is integrated by a condenser trigger counting circuit. During one year of operation the exposure register contributed to obtaining spectrophotographs of almost equal density from sources having widely different intensities. (*Same item as* 7.1-151, *Met. Abstracts.*) *Subject Headings:* **1. Auroral spectrographs 2. Photoelectric receivers.**—*G.T.*

12A-115 551.594.51

Jones, A. Vallance, **An atlas of the auroral spectrum.** Saskatchewan. Univ. Physics Dept., Contract AF 19(122)-152, Scientific Report, AR-20, [**1955?**]. 8 p. 5 figs., 3 refs. Append. **DWB**—This report comprises a set of microphotometer tracings of photographs of the auroral spectrum obtained at Saskatoon from 1952-1954. The positions of molecular bands and atomic lines known or claimed to be present in the auroral spectrum have been drawn in on the charts. The relative intensities for L-S coupling of the lines within the multiplets have been indicated. (*Same item as* 7.2-280, *Met. Abstracts.*) *Subject Headings:* **1. Auroral spectra 2. Auroral atlases 3. Saskatoon, Saskatchewan.**—*Author's abstract.*

12A-116 551.501.89:551.594.5(427.1)

Kaiser, T. R. and Bullough, K. (*Jodrell Bank Exper. Stat., Univ. of Manchester Lr. Withington, Macclesfield, Cheshire, Eng.*), **Radio echoes from aurorae.** *Annales de Géophysique*, Paris, 11(3):279-283, July/Sept. **1955.** 5 figs., 9 refs. **DLC**—Radio echo auroral observations made at Jodrell Bank from 1950 to 1953 are analyzed. A systematic picture is obtained of the special distribution and motion of the reflective ionization. A close correlation of the results is found with visual auroral and magnetic data. *Subject Headings:* **1. Radio observation of auroras 2. Jodrell Bank, Eng.,**—*Authors' abstract.*

12A-117 551.594.51:551.594.12:551.501.8

†Kaiser, T. R. (*Dept. of Physics, Univ. of Reading, Berks*), **Radio investigations of aurorae and related phenomena.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 156-173. 8 figs., table, 41 refs., eqs.) **DWB**—The paper discusses in some detail the characteristics of auroral ionization as revealed by metre wavelength radio-echo observations in the auroral and subauroral regions. A close association between the radio-echoes, visual auroras, magnetic activity, and radio-star scintillations is revealed. A similar correspondence appears to exist between low-frequency auroral-type echoes and scintillations in the minauroral region, although these show some marked differences from the high-latitude phenomena. Some suggestions are made for future

lines of work, particularly during the International Geophysical Year, 1957–58. (*Same item as* 8.7–341, *Met. Abstracts.*) *Subject Headings:* **1. Auroral ionization 2. Radio echoes from auroras.** —*Author's abstract.*

12A–118 551.594.51:551.594.12

Kaiser, T. R. (*Dept. of Physics, Univ. of Sheffield 10, Eng.*), **The geometry of auroral ionization.** *Journal of Geophysical Research,* Wash., D. C., 62(2):297–298, June **1957.** 2 figs., 5 refs. **DLC**—A note comparing the interpretation of results obtained by the author at Jodrell Bank in 1954, with the interpretations of PETERSON (1955) at Stanford. It is explained that the pattern of radio echoes from auroral and auroral-type ionization agrees with the hypothesis that it is distributed along an arc which follows a parallel of magnetic latitude, rather than with the assumption of extreme specular reflection from narrow columns of ionization aligned with the earth's magnetic lines of force. *Subject Headings:* **1. Auroral ionization 2. Radio echoes from auroras 3. Auroral-geomagnetic relationships 4. Jodrell Bank, Eng.**—*E.Z.S.*

12A–119 551.506:930.2(261,7) 551.594.52

Kalm, Pehr, **Meteorological observations in North America.** Transl. and ed. by Esther Louise Larsen. Comments by Paul H. Oehser. *Washington Academy of Sciences, Journal,* 45(9):269–275, Sept. **1955.** 2 foot-refs. **DLC**—PEHR KALM, a Swedish student of LINNAEUS, spent 2½ years in North America and published his journal **En Resa till Norra America** in 3 vols. (Stockholm 1753–61). Notes from the journal are quoted extensively. Keen and detailed observations of the aurora are compared with observations made in Sweden during the same period and it was found that whenever auroras were strong in North America they were strong in Sweden, but not vice versa. The author also took numerous observations of air and water temperature on his two crossings of the Atlantic and in wells and streams. He noted the fact that water temperature was sometimes higher and sometimes lower than the air temperature. Readings were made of water taken from the sea surface by means of a bucket. Celsius scale was used in all readings. (*Same item as* 7.11–52, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Historical weather records 3. Air-sea temperature observations. I. Larsen, Esther Louise** (*transl.*) **II. Oehser, Paul H.**—*M.R.*

12A–120 551.594.5:551.590.21

Karapiperis, Leon N. (*Univ. of Athens, Greece*), **Some appearances of the aurora borealis in Greece.** *Geofisica Pura e Applicate,* Milan, 35:139–142, Sept./Dec. **1956.** 17 refs. **DLC**—Historic and recent observations of auroras show that this phenomenon is not exceptionally rare in Greece. The appearances coincide with the years of maximum solar activity and especially 1–2 yrs after it, while in the years of minimum solar activity or near these years no auroras were observed. All auroras, with the exception of two, were observed in or around spring and autumn. The most southern point at which auroras were observed in Greece is at 35°N lat. (*Same item as* 9.4–275, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Auroral-solar relationships 3. Greece.**—*Author's abstract.*

12A–121 551.594.52:551.557

Kim, J. S. and Currie, B. W., **Horizontal movements of aurora.** *Canadian Journal of Physics,* Ottawa, 36(2):160–170, Feb. **1958.** 2 figs., 4 tables, 18 refs. **DWB, DLC**—Measurements on the drifts of auroral forms at three stations to the south of the auroral zone in West-Central Canada failed to show evidence of a motion due to the earth's rotation relative to fixed excitation patterns in space. The distribution and the magnitude of the speed of auroral structures parallel and normal to the geomagnetic meridians are substantially the same as for nonluminous ionic irregularities observed by radio methods. The speed of an auroral arc or band parallel to the geomagnetic meridian is apparently constant. Speeds increase with geomagnetic activity, particularly in an east-west direction. There is no definite indication of a reversal of the east-west motions close to local midnight. Speeds and directions show no characteristic variations with the time of night. (*Same item as* 9.9–316, *Met. Abstracts.*) *Subject Headings:* **1. Auroral drift 2. Auroral-geomagnetic relationships 3. West Central Canada.**—*Authors' abstract.*

12A–122 551.594.5:551.510.535

Knecht, R. W. (*Natl. Bur. of Standards, Boulder, Colo.*), **Relationships between aurora and sporadic-E echoes at Barrow, Alaska.** *Journal of Geophysical Research,* Wash., D. C., 61(1):59–69, March **1956.** 8 figs., 16 refs. **DLC**—During March 1951, a series of visual auroral observations were made simultaneously with ionospheric soundings at Barrow, Alaska (71° north, 156° west). Auroras were visible during 82% of the 379 observations, made at least every 15 min. during the dark hours of 10 successive clear nights. Three nights are described in detail. Statistical results include (1) a strong tendency for sporadic-*E* (*Es*) echoes at frequencies ≥ 7 Mc to be recorded when aurora was near the zenith; (2) a direct relationship between brightness of (inactive) aurora and the top frequency of *Es* echoes; (3) evidence for the correspondence of (oblique) *Es* echo ranges with estimated slant ranges of visible auroral forms. The observations lend support to the view that ionization in the immediate vicinity of visible auroral forms gives rise to ionospheric-type reflections at high frequencies. (*Same item as* 7.9-267, *Met. Abstracts.*) *Subject Headings:* **1. Auroral-ionospheric relationships 2. Sporadic E layer echoes 3. Barrow, Alaska.**—*Author's abstract.*

12A-123 . 551.**521.64**:551.**594.5**:551.**510.53**

Korff, S. A. and Haymes, R. C. (*both, N. Y. U., New York*), **High neutron and radiation intensities at balloon altitudes during auroral display.** *Journal of Geophysical Research,* Wash., D. C., 65(10):3163–3167, Oct. **1960.** 3 figs., 8 refs. **DLC**—A balloon flight at 40-km altitude, instrumented with neutron counters, recorded high neutron intensities as well as high ionization levels during an auroral display. The observations are consistent with the possibility that the neutrons were produced by protons of 50 or more Mev in energy at the balloon's altitude. *Subject Headings:* **1. Neutron intensities 2. Balloon-borne neutron counters 3. Auroral radiations.**—*Author's abstract.* Ⓢ

12A-124 551.**510.53**

Kosibowa, Stefania (*Univ. of Wroclaw*), **O badaniach wyższych warstw atmosfery ziemskiej.** [Studies of the upper layers of the earth's atmosphere.] *Przegląd Geofizyczny,* Warsaw, 1(1):67–76, **1956.** 3 figs., table, 8 refs. **DLC**—A detailed survey of achievements in the study of upper air layers made by world scientists. The author takes up successively the questions of the D, E, F1 and F2 layers, atmospheric, solar and lunar tides, the ionosphere, iridescent clouds, meteors, the phenomena of twilight and night luminescence of the sky, aurora borealis, etc. (*Same item as* 8H–80, *Met. Abstracts.*) *Subject Headings:* **1. Upper atmosphere 2. F layers 3. Ionospheric tides 4. Auroras.**—*A.M.P.*

12A-125 551.**521.67**:551.**594.51**:551.**594.12**:535.33

Krasovskiĭ, V. I., **Kharakteristika svoĭstv korpuskuliarnogo izlucheniia solntsa po sprektram poliarnykh siianiĭ.** [Characteristics of solar corpuscular radiation determined from spectra of auroras.] *Astronomicheskiĭ Zhurnal,* Moscow, 35(2):222–226, March/April, **1958.** 13 refs. English summary p. 222. **DLC.** Transl. into English in corresponding issue of *Soviet Astronomy AJ,* New York.—The spectra of auroras show that low-latitude auroras are excited by particles with shorter paths, as compared with high-latitude auroras. It suggested that in some cases the emission may be explained by the following mechanism

$$N(^4S) + He^+(^2S) \rightarrow N^+(^3D) + He(^1S)$$

This applies particularly to the spectrum of the auroras observed near Moscow on January 21, 1957. *Subject Headings:* **1. Solar corpuscular influences on upper atmosphere 2. Solar effects on auroras 3. Auroral spectra 4. Moscow, U.S.S.R.**—*Physics Abstracts.*

12A-126 551.**501.81**:551.**594.5**

†Lange-Hesse, Gunther (*Max-Planck-Inst. f. Physik der Stratosphäre, Lindau ü. Northeim, Hann.*), **Rückstrahlung kurzer und ultrakurzer Wellen an Polarlichtern.** [Reflection of short and ultrashort waves from polar auroras.] *Archiv der Elektrischen Übertragung,* Stuttgart, 11(6):253–261, June **1957. Pt. 2,** *Ibid.,* 11(7):283–288, July **1958.** figs., 92 refs. English summary p. 253. **DLC**—Recent progress achieved in different countries in observing and interpreting auroral echoes is reviewed. Sample radar scope photographs, and diagrams of echo distribution are presented. Applications to radio communication, navigation and auroral observation are discussed. Of various interpretations proposed so far concerning different characteristics of auroral echoes, the author favors those of BOOKER. (*Same item as* 9H–128, *Met. Abstracts.*) *Subject Heading:* **1. Radar echoes from auroras.**—*G.T.*

12A-127 551.**594.5**:551.**521.326**

Lange-Hesse, G., **Das International Geophysikalische Jahr, XII: Polarlicht und Nachthimmelsleuchten.** [The IGY, Pt. 12, Aurora and night sky light.] *Umschau,* 57(23):707–709, Dec. 1, **1957.** 4 figs., footnote refs. **DLC**—There is a permanent weak light source round the earth, and a much stronger occasional ring of light 22–24° from the magnetic pole. This is the aurora. The cause of the night sky light is the ionization and dissociation of gases by UV sunlight at great heights; that of aurora, corpuscular rays from the sun focused by the geomagnetic field. The IGY program for world-wide study of aurora is set out, including tropics and radio waves, and especially German contributions to observation of aurora and night sky light. (*Same item as* 9.4–276, April 1958, *Met. Abstracts.*) *Subject Headings:* **1. Auroras 2. Night airglow.**—*C.E.P.B.*

12A–128 551.582.1:551.594.5(265/266)

†*Law, P. G. and Burstall, T., **Macquarie Island.** *Australian National Antarctic Research Expeditions, Interim Reports,* No. 14, Sept. **1956.** 48 p. 11 plates, 5 tables, 70 refs. **DWB** (M06.5 A938i)—The general climatic features of the island are covered on p. 28–35 of this monograph. Observation and research work in geomagnetism, cosmic rays, aurora and radiophysics is covered on p. 36–43. Activities are illustrated and many references to works on the region appended. The history of the island, of the station on the island and of work in each field of endeavor is outlined in detail in each separate chapter. (*Same item as* 9.2–57, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations in Antarctic 2. Macquarie Island.**—*M.R.*

12A–129 551.501.81:551.594.5

Leadabrand, R. L.; Presnell, R. I.; Berg, M. R. and Dyce, R. B. (*all, Stanford Res. Inst., Menlo Park, Calif.*), **Doppler investigations of the radar aurora at 400 Mc.** *Journal of Geophysical Research,* Wash., D. C., 64(9):1197–1203, Sept. **1959.** 9 figs., 11 refs. **DLC**—By means of a relatively sensitive 400-Mc radar located at College, Alaska, the variation of Doppler shift of auroral echoes has been determined as a function of the following parameters: (1) azimuth angle of the radar ray; (2) off-perpendicular intersection angle of the radar ray and the earth's magnetic field; (3) elevation angle of the radar ray; (4) range of the echoes; (5) altitude of the reflection centers; (6) time of day; (7) number of occurrences; (8) strength of the echoes. These data have been further delineated in terms of the type of echo seen (discrete or diffuse) and whether the data were taken before or after magnetic midnight. An estimate of the spectrum spread of auroral echoes has also been determined by pulse and by CW techniques. A consistent trend in these data has been found which would indicate an east-west motion of the ionospheric irregularities. There is no appreciable variation in the direction of motion with time or day or with respect to magnetic midnight. The mean velocity of the east-west motion appears to be 500 m/sec. These conclusions agree with those of KIM and CURRIE (1958) but disagree with those of LYON and KAVADAS (1958), NICHOLS (1957), and BULLOUGH et al. (1957). (*Same item as* 11H–83, *Met. Abstracts.*) *Subject Headings:* **1. Radar echoes from auroras 2. Doppler displacement of auroral echoes.**—*Authors' abstract.* Ⓢ

12A–130 551.594.51:551.521.9

Lebedinskiĭ, A. I. (*Univ. of Moscow*), **Electrical discharges and the interpretation of auroral types.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 222–224. fig., 3 refs., 5 eqs.) **DWB**—Discharge theories of auroral arcs and of auroral rays are presented, and numerical estimates of the characteristics of the discharges are made. (*Same item as* 8.7–342, *Met. Abstracts.*) *Subject Headings:* **1. Auroral theories 2. Auroral emissions.**—*Author's abstract.*

12A–131 551.501.81:551.594.5

Leonard, Robert S., **Radar echoes from the aurora.** (In: Conference on Arctic Radio Wave Propagation, Alaska Univ., Jan. 1956, **Papers.** Issued May **1956.** p. 58–71. 8 figs.) **DWB**—Auroral radar work at Geophysical Institute is described. The major difference between the ordinary and the auroral radar is that the latter uses pulse lengths in the order of 100 microseconds to one millisecond and has much lower operative frequencies. The auroral radar experiments obtain no echoes from aurora overhead despite visual aurora in the sky. Three different theories explaining auroral echoes are given. The theory postulated by BOOKER, GARTLEIN and MARTIN states that echoes are possible only when the radio ray is nearly perpendicular to aurora. This appears to be the correct explanation of the observed phenomenon. *Subject Heading:* **1. Radar echoes from auroras.**—*A.H.K.*

12A–132 551.594.5:551.510.62

†Little, C. G. (*Asst. Dir., Geophysical Inst., Alaska*), **Radio wave propagation in the Arctic** Alaska. Univ. Geophysical Institute, Contract AF 19(604)-1089, Interim Scientific Report No. 1, Aug. 15, **1955.** 74 p. 23 figs. (incl. photos), 3 tables, 23 refs.—An extensive study of radar echoes from auroras (on 12, 25, 50 and 100 mc), involving correlation with visual aurora (as shown by panoramic photographs made simultaneously at College, Alaska), shows that radio echoes probably come from ionized columns in the immediate vicinity of visible auroral forms, contrary to theory of HARANG and LANDMARK (1954). Sixteen pairs of photographs presented in this report show good agreement as to direction and distance, and the few exceptions are explained as due to abnormally high visible or faint diffuse forms. Three theories concerning the mode of reflection from ionized auroral layers are examined and the one of R. K. MOORE (1952) involving right angle reflection from ionized columns oriented along magnetic lines of force is shown to agree with actual observations of 311 auroral forms from Aug. Oct. 1954. Greatest concentration is to be N by NE (geomagnetic) and about 600 km distant. None occur overhead and few to the S. Theoretical distribution chart gives nearly same pattern. Attempts at using longer waves (than 106 mc) have thus far been unsuccessful. Experiments on a microwave link 25 mi long failed to show any meteorological influence

(ducts). Most winter time ducts are too close to ground to be of any use with normal equipment which sticks up above the duct. An all-sky camera has been used for a year at College and for a shorter time at Pt. Barrow; analysis of the 180° bends show that these are very frequent (105 cases), with openings to W just before midnight and to E at 0300 being most frequent. Movements of bends to E or W were more random than theorized by MEINEL and SCHULTE (1953) who reported only westward drifts during evening and eastward during morning hours. A good correlation was found between intensity of auroral light and E_s ionization. Whistlers were studied with special equipment and comparison will be made with those at lower latitudes (Corvallis, Ore. and Stanford) to see if dispersion is much greater in high latitudes as predicted. Between July 1 and 10, 1955, 38 whistlers were recorded. Abnormal TV signal reception and scatter was observed over high peaks of Alaska Range. (*Same item as* 9.8–29, *Met. Abstracts.*) *Subject Headings:* **1. Auroral studies 2. Whistlers 3. Tropospheric radio wave propagation 4. College, Alaska. I. Alaska. Univ. Geophysical Institute.**—*M.R.*

12A–133 551.594.5:016

†London. Science Museum. Science Library, **The aurora borealis.** Its *Bibliographical Series,* No. **491, 1939.** 46 p. Mimeo. **DLC**—The 879 references are divided into six groups: books, general articles, photographs, physics, height and geographical distribution, and periodicity. Imprints for the first group are from 1871–1937, for groups 2–6 from 1901–1937. Items in each group are arranged chronologically. The bibliography is not annotated. (*Same item as* 6B–25, *Met. Abstracts.*) *Subject Heading:* **1. Auroral bibliographies.**—*M.L.R.*

12A–134 551.501.81:551.594.5

Lyon, G. F. (*Univ. Saskatchewan*), **The association of visible auroral forms with radar echoes.** *Canadian Journal of Physics,* Ottawa, 38(3):385–389, March **1960.** 2 figs., table, 9 refs. **DWB, DLC**—A peak in 48.2-Mc/sec echo occurrence is observed at Saskatoon corresponding in time to the period of breakup of quiet arcs into active rayed structures. This is also the time of most frequent occurrence of characteristic "curl" forms in the aurora. If, as GARTLEIN suggests, the "curl" forms are formed by instabilities in a sheet beam then the primary particles are positively charged. *Subject Headings:* **1. Radar echoes from auroras 2. Auroral forms 3. Saskatoon, Canada.**—*Author's abstract.* Ⓢ

12A–135 551.594.52:778.3

McEwen, J. and Montalbetti, R., **Parallactic measurement on aurorae over Churchill, Canada.** *Canadian Journal of Physics,* Ottawa, 36(12):1593–1600, Dec. **1958.** 5 figs., table, 9 refs. **DWB, DLC**—Height measurements on the lower edges of homogeneous and rayed arcs and bands are reported from **404** photographs taken of aurorae over Churchill (58.8°N, 94.2°W) during the winter of 1957–58 as part of the IGY program. The frequency distribution in height of 1975 points measured shows a double peak at **101** and **107 km,** and a mean height of **104.8 km.** The chief factor affecting height of aurora appears to be that of intensity; the mean height of weak aurorae was found to be **107.7 km,** while that of strong aurorae was **100.1 km.** No difference in mean height of aurorae before and after midnight was observed. Tidal effects in the upper atmosphere did not appear to affect auroral height greatly. The mean heights of aurorae measured during high and low tide conditions showed no appreciable difference. A mean orientation of 105.5° magnetic azimuth was measured for auroral arcs. Auroral motions with speeds up to **2500 m/sec** were observed. (*Same item as* 10.10–309, *Met. Abstracts.*) *Subject Headings:* **1. Auroral height determination 2. Auroral height distribution 3. Churchill, Canada.**—*Authors' abstract.*

12A–136 551.594.52(267)

McInnes, B., **Auroral display observed from unusually low geomagnetic latitudes.** *Meteorological Magazine,* London, 86(1018):114–117, April **1957.** fig., 2 refs. **DWB**—Observations of aurora from ships in S. Indian Ocean (geomagnetic coordinates 43°S, 184°E and 37°S, 129°E) on Sept. 8, 1956, are described. There was a world-wide magnetic storm, radio effects, etc. (*Same item as* 8.8–315, *Met. Abstracts.*) *Subject Headings:* **1. Low latitude auroras 2. Indian Ocean.** —*C.E.P.B.*

12A–137 551.506.9:551.594.5

McInnes, B. and Robertson, K. A., **Aurora.** *Marine Observer,* London, 30(189):135–139, July **1960.** fig., tables. **DWB, DLC**—A log is given listing auroral observations for the period July–September 1959 and some comments on the outstanding auroral displays. The auroras are classified and their geomagnetic latitudes and longitudes and inclinations are given. The most outstanding display was observed during 15–18th July. This geomagnetic storm had a significant effect on some ships' compasses and also affected radio reception. *Subject Heading:* **1. Auroral data.**—*R.B.* Ⓢ

12A-138 551.501.89:551.594.5 551.501.89:551.590.25 551.510.535

McKinley, D. W. R. and Millman, Peter M., **Long duration echoes from aurora, meteors, and ionospheric back-scatter.** *Canadian Journal of Physics*, 31(2):171–181, Feb. **1953.** 2 figs., 6 tables, 10 refs. **DLC**—In the course of the Ottawa meteor program some unusual echoes have been detected on 33 Mc. Echoes from the aurora are discussed and correlated with visual observations. Two mechanisms of radio reflections from the aurora have been proposed but the data here presented are insufficient to favor one or the other. On Aug. 4, 1948 six extremely long duration meteor echoes were observed. Since Aug. 1948, a weak semipermanent echo has been recorded, usually appearing at a range of about 80 km, and enduring up to an hour. It is suggested that this echo is due to backscatter from the same sources in the lower E region that are presumed to be responsible for long-range very high frequency propagation. (*Same item as* 4.10–33, Oct. 1953, *Met. Abstracts.*) *Subject Headings:* **1. Radio echoes from auroras 2. Meteor trails 3. E layer.**—*Authors' abstract.*

12A-139 551.594.5

McLaughlin, Dean B. (*Michigan Univ.*), **A note on the motion of auroral streamers.** *Astrophysical Journal*, 120(1):185, July **1954. DWB**—During a display on March 22, 1920 it was noted that the drift was westward in the evening hours and eastward after midnight. (*Same item as* 6.7–342, *Met. Abstracts.*) *Subject Heading:* **1. Auroral streamer drift.**—*M.R.*

12A-140 551.501.89:551.594.52

McNamara, A. G. and Currie, B. W. (*Physics Dept., Univ. of Saskatchewan, Saskatoon*), **Radio echoes during aurora.** *Journal of Geophysical Research*, 59(2):279–285, June **1954.** 4 figs., 6 refs. **DLC**—A reassessment of all the Saskatoon data on 56- and 106-Mc/sec echoes from aurora suggested that some of the 56-Mc/sec echoes might have occurred through backward scatter from the land via the lower part of the ionosphere. These could have originated only through the second-lobe transmission of the radar equipment. Two antennae placed at heights to give the maximum resolution between echoes arising in directions corresponding to the first- and second-lobe signals were used to examine this possibility. The results show that practically all (if not all) the echoes were due to direct reflection from aurora. (*Same item as* 6.2–39, *Met. Abstracts.*) *Subject Headings:* **1. Radio echoes from auroras 2. Auroras 3. Saskatoon, Saskatchewan.**—*Authors' abstract.*

12A-141 551.594.5:551.501.89

McNamara, A. G. and Currie, B. W., **Polarization of radio echoes from aurorae.** *Nature*, London, 174(4442):1153–1154, Dec. 18, **1954.** 3 figs., 6 refs. **DWB**—Observations at Saskatoon on 56 Mc/s are analyzed statistically for ratio (horizontal/vertical polarization) frequency variation as a function of range, showing a significant increase at 500–900 km, and echo occurrence against radar range. Some observations on 106.5 Mc/s are included; these showed only plane polarization in sense of transmitted signals. (*Same item as* 6.6–339, *Met. Abstracts.*) *Subject Headings:* **1. Radio echoes from auroras 2. Saskatoon, Canada.**—*C.E.P.B.*

12A-142 551.501.81:551.594.5

McNamara, A. G. (*Saskatchewan Univ., Saskatoon, Canada*), **Double-Doppler radar investigations of aurora.** *Journal of Geophysical Research*, Wash., D. C., 60(3):257–269, Sept. **1955.** 7 figs. (incl. photos), 11 refs. **DLC**—A pulsed double-Doppler radar technique has been employed to study the 90.7 Mc/sec signals reflected from auroral ionization. A spectrum analyzer was used in conjunction with the radar to measure the power spectra of the auroral echoes. The Doppler data are compared with observations of the visible aurora and with simultaneous echoes on 56 and 106 Mc/sec non-coherent high-resolution radar equipment. An interpretation of the Doppler data is given, and several theoretical models of the reflection mechanism are examined in terms of their effect on the observed spectra. (*Same item as* 7.10–71, *Met. Abstracts.*) *Subject Heading:* **1. Radar echoes from auroras.**—*Author's abstract.*

12A-143 551.501.81:551.594.5

McNamara, A. G., **A continuously recording automatic auroral radar.** *Canadian Journal of Physics*, Ottawa, 36(1):1–8, Jan. **1958.** 6 figs., 6 refs. **DWB, DLC**—A simple, low-power 50 Mc/s radar is described which has been designed for automatic recording of radio reflections from auroral ionization. The system features high sensitivity with good reliability. Photographic records are taken in the form of a continuous film strip displaying range and time. A complementary recording system employs circuitry which cancels interference and noise signals but produces an output signal proportional to the integrated echo intensity. The display in this latter case is in the form of a chart record from which data are immediately available. (*Same item as* 9.7–102, *Met. Abstracts.*) *Subject Headings:* **1. Radar echoes from auroras 2. Auroral recorders.**—*Author's abstract.*

12A–144 551.594.52

McQuistan, G. W. and Thomsen, I. L., **Theory of the determination of auroral heights and locations from photographs.** Wellington, New Zealand. Carter Observatory, Contract AF 64(500)-1, Scientific Report, No. 1, June 30, **1954.** 8 p. figs., 14 eqs. **DWB**—The method described (which is used at Carter Obs., N. Z.) is based on the Norwegian method of Carl Störmer, modified for the sake of simplicity without loss in accuracy. The subjects discussed are 1) altazimuth grids for a single station, 2) lens distortion, 3) auroral forms and features in altazimuth coordinates, 4) base-line constants, 5) spherical coordinates with the base-line as axis, 6) finding corresponding points, 7) heights and geographical location of aurora. The methods are described in sufficient detail, with mathematics and diagrams, so as to be readily applicable in practicable calculations of auroral height from 2-station photographs. (*Same item as* 6.7–343, *Met. Abstracts.*) *Subject Headings:* **1. Auroral height determination 2. Auroral photograph calculations 3. New Zealand. I. Störmer, Carl.**—*M.R.*

12A–145 551.594.52

*McQuistan, G. W.; Frankpitt, B. L. and Thomsen, I. L., **Heights and locations of the aurora australis.** Wellington, N. Z. Carter Observatory, Contract AF 64(500)-1, Scientific Report, No. 2, July 1, **1954.** 8 p. tables, 4 refs., eqs. **DWB**—Although data for only 3 auroral displays (in 1951) are calculated and analyzed, the comparison of height determinations obtained from dual measurements and presented here is unique. The photographic measurements were made at two stations: Taieri (45°51′S, 170°E) and Invercargill (46°25′S, 168°E) in New Zealand, with cameras loaned by Carl Störmer, operated by meteorological personnel at airports in these places. Photographic work was synchronized by telephone. It was found that accuracy of 2% at 250 km height, and 1.5% at 95 km height was possible, so figures on auroral heights are seldom accurate to more than ±1 km, and usually to ±5 km. No aurora intense enough to photograph has occurred in area since 1951. (*Same item as* 6.9–338, *Met. Abstracts.*) *Subject Headings:* **1. Auroral heights 2. Auroral photography 3. New Zealand.**—*M.R.*

12A–146 551.576:551.594.5

*McQuistan, G. W. and Frankpitt, B. L., **Night cloud cover in New Zealand and its effect on auroral frequencies.** Wellington, New Zealand. Carter Observatory, Contract AF 64(500)-1, Scientific Report, No. 5, **1954.** 9 p. tables. **DWB**—The diurnal, seasonal and regional variation in cloud cover is determined from 15 stations in New Zealand and Campbell Island ranging from 35° to 53°S lat. using records for 1950–1954, and the possible effect on auroral frequencies observed in New Zealand evaluated. Observations and methods of reduction of data are described. Total cloud cover and cloud cover over the SE to SW sector up to 45° elevation angle are used as criteria. Diurnal variations should not affect observation of aurora, but seasonal and regional variations are substantial. Cloudiness is at a maximum in Oct. and in the South (West Coast) and a minimum in Sept. and in the North and on East Coast. No difference is found in whole sky and south sector variations. Table gives % frequency of cloudy nights in each month and for each station. Finally, the effect of partly cloudy and cloudy sky on actual frequency of aurora observed is worked out mathematically for general use anywhere. (*Same item as* 6.9–247, *Met. Abstracts.*) *Subject Headings:* **1. Cloud frequency data 2. Auroral-cloudiness relationships 3. Auroral frequencies 4. New Zealand.**—*M.R.*

12A–147 551.594.5(45)

Maffei, P., **Aurore boreali osservate dalla Stazione Astronomica di Loiano negli anni 1957–1958.** [Auroras observed at the astronomical station of Loiano during 1957–1958.] *Annali di Geofisica,* Rome, 12(2):215–225, April/May **1959.** ref. Italian and English summaries p. 225. **DLC**—Three auroras observed from the Astronomical Observatory of Loiano (Bologna) on the nights of Jan. 21–22, 1957, July 8–9, 1958, Sept. 4–5, 1958, are described. *Subject Headings:* **1. Auroral descriptions 2. Bologna, Italy.**—*Author's abstract.* Ⓢ

12A–148 551.506.9:551.594.5(99)

Malville, J. M. (*High Altitude Obs., Boulder, Colo.*), **Antarctic auroral observations, Ellsworth Station, 1957.** *Journal of Geophysical Research,* Wash., D. C., 64(10):1389–1393, Oct. **1959.** 9 figs., 13 refs. **DLC**—Auroral observations made during the Antarctic winter of 1957 are summarized. The data discussed include daily variation, east-west drift, and hydrogen emission. From a comparison of observations made at Ellsworth and the South Pole evidence is obtained of a spiraling zone of maximum auroral activity. *Subject Headings:* **1. Auroral observations 2. Aurora australis 3. Antarctica.**—*Author's abstract.* Ⓢ

12A–149 551.594.5:662.2:539.1

Malville, J. M. (*High Alt. Obs., Univ. of Colorado, Boulder, Colo.*), **Artificial auroras resulting from the 1958 Johnston Island nuclear explosions.** *Journal of Geophysical Research,* Wash., D. C., 64(12):2267–2270, Dec. **1959.** 2 tables, 15 refs., 5 eqs. **DLC**—Beta decay electrons traveling along magnetic lines of force are shown to be capable of accounting for the artificial aurora which appeared at the conjugate point of Johnston Island after the explosion of Aug. 1. Dissociate recombination and ion-atom interchange are suggested as the primary exciting mechanisms of the oxygen forbidden lines in the artificial auroral rays and may account, when combined with collisional de-excitation, for the observed violet color of the rays The high-altitude arc may be a form of auroral afterglow and may result from a process similar to that which enhances the oxygen red lines in twilight. *Subject Headings:* **1. Artificial auroras 2. Nuclear explosions in upper atmosphere 3. Johnston Island.**—*Author's abstract.* Ⓢ

12A–150 551.594.51:535.33:621.396.8

Manring, E. R. and Pettit, H. B. (*both, GRD, A.F. Camb. Res. Ctr., Mass.*), **Photometric observations of the 5577 A and 6300 A emissions made during the aurora of Feb. 10 11, 1958.** *Journal of Geophysical Research,* Wash., D. C., 64(2):149–153, Feb. **1959.** 7 figs., table, 4 refs. **DLC**—The intense auroral activity of Feb. 10–11, 1958, was recorded on airglow photometers at Sacramento Peak, N. Mex., and at Tonantzintla, Mexico. At Sacramento Peak the whole sky varied in intensity from 10^5 to 10^8 Rayleighs for the 6300 A emission, and from slightly less than 10^3 to more than 10^4 Rayleighs for the 5577 A emission. The ratio of the intensity of the 6300 A emission to that at 5577 A was about 2.5×10^3 throughout the night. There was no enhancement of the 5890 A emission. At Tonantzintla, the 5577 A emission varied from 200 to 600 Rayleighs. Contour lines of equal intensity were nearly perpendicular to the geomagnetic meridian at both sites. An interesting correlation occurs between absorption measurements of cosmic radio noise made at Boulder, Colo., and the intensity variation of the 5577 A and 6300 A emissions as observed at both Sacramento Peak and Tonantzintla. (*Same item as* 10.10–307, *Met. Abstracts.*) *Subject Headings:* **1. Auroral emissions 2. Auroral intensity measurement 3. Radio noise—auroral emission relationships.**—*Authors' abstract.* Ⓢ

12A–151 551.594.5:621.391.8

Martin, L. H.; Helliwell, R. A. (*both, Radioscience Lab., Stanford Univ., Calif.*) and Marks, K. R. (*U. S. Antarctic Res. Program, Wash. 25, D. C.*), **Association between aurorae and very low-frequency hiss observed at Byrd station, Antarctica.** *Nature,* London, 187(4739):751-753, Aug. 27, **1960.** 5 figs., 6 refs. **DWB, DLC**—Observations during 1959 show a close association to exist between auroras and certain very low frequency hiss. The hiss usually occurs in a broad band with a center-frequency of about 8 kc/s. The intensity and band-width vary with ionospheric absorption and may also vary with the intensity of the auroras. The hiss drops to undetectable levels under conditions of extreme ionic absorption even in the presence of intense and active auroras. The center frequency of the hiss may be associated or related to the type of aurora. *Subject Headings:* **1. Low frequency hiss 2. Auroral effects on radio wave propagation 3. Radio noise 4. Byrd Station, Antarctica.**—*R.B.* Ⓢ

12A–152 551.508.362.1:551.594.5 551.510.53

Massey, H. S. W., **The nature of the upper atmosphere.** *Endeavour,* London, 13(50):81–85, April **1954.** 4 figs., 6 refs. **DLC**—General but semitechnical treatment of structure and composition of the high atmosphere, the ionosphere, aurora and airglow according to latest results of rocket and radio research. (*Same item as* 6.4–117, April 1955, *Met. Abstracts.*) *Subject Headings:* **1. Upper atmosphere structure 2. Auroras 3. Rocket observations.**—*M.R.*

12A–153 551.594.5(09)

Matsushita, S. (*High-Altitude Obs., Univ. of Colo.*), **Ancient aurorae seen in Japan.** *Journal of Geophysical Research,* Wash., D. C., 61(2, Pt. 1):297–302, June **1956.** 3 figs., table. **DLC**—A critical analysis and tabulation of data on auroras observed in Japan from 620 AD to 1909 (taken from NIPPON KISHO-SHIRYO, **Historical Data on Meteorology in Japan, 1939 and 1943**). Many of these reports may have been reports of zodiacal light or twilight phenomena, so each report is evaluated according to author's estimate of reliability. The reports are then correlated graphically with sunspot periods and with auroras in other parts of the world. Seasonal distribution of all reports and of "probable" auroras show usual bimodal distribution with maximum in Feb.–March and in Sept. and minimum in Dec.–Jan. and Jun.–Aug. (*Same item as* 8.10–298, *Met. Abstracts.*) *Subject Headings:* **1. Auroral catalogs 2. Historic auroras 3. Japan.**—*M.R.*

12A–154 551.594.5:551.594.13

Mawdsley, J. (*Dominion Physical Lab., New Zealand*), **Movement of auroral ionization.** *Journal of Geophysical Research,* Wash., D. C., 65(6):1825–1827, June **1960.** 8 refs. **DLC**—Discussion concerns the possibility that the systematic movement of visual auroras reveals the electron-drift pattern of the magnetic disturbance current system. *Subject Headings:* **1. Auroral ionization 2. Auroral movement.**—*E.Z.S.* Ⓢ

12A–155 550.384.4:551.594.52

Mayaud, P. N., **Activité magnétique dans les régions polaires.** [Magnetic activity in the polar regions.] *Annales de Géophysique*, Paris, 12(1):84–101, Jan./March **1956.** 12 figs., 5 tables, 16 refs. At head of article: Rapports scientifiques des Expéditions Polaires Françaises S IV 2. **DLC**—Some of the records obtained at Adélie Land are reproduced. An analysis of both hemispheres, based on data from 52 stations reading from 80°N (Thule) to 78°S (Little America), shows the diurnal variations of geomagnetic activity as a function of geomagnetic inclination. Isolines are compared with auroral frequency. A comparison with the Chapman-Ferraro theory is made. (*Same item as* 9.8–31, *Met. Abstracts.*) *Subject Headings:* **1. Diurnal geomagnetic variations 2. Auroral frequencies 3. Polar regions.**—*A.A.*

12A–156 551.510.535:551.594.5

Mednikova, N. V., **Ionosfernye vozmushcheniia osobogo tipa.** [Particular types of ionospheric disturbances.] *Akademiia Nauk SSSR, Doklady,* 59(3):475–478, Jan. 21, **1948.** 3 figs., ref. **DLC**—Observations of an aurora on Feb. 16, 1947 carried out at the meteorological stations of the Institute of Terrestrial Magnetism near Moscow with the aid of automatic equipment with a frequency range from 2 to 16 MHz led to the discovery of a particular type of ionospheric disturbance—an additional layer located above the normal F2 layer with critical frequencies much smaller than the ones of the F2 layer. The diffusivity of this layer increased with the growth of the disturbance but instead of rising as does the F2 layer it descended gradually. A subsequent careful examination of earlier records of ionospheric disturbance showed that from March 1946 to April 1947, 27 disturbances accompanied by appearances of this additional layer above F2 were recorded. It has been noted that this layer does not appear in all cases of high activity of auroras, but is always accompanied by auroras and at the time when the critical frequencies of F2 layer do not exceed 6 MHz. Photographs and graphs showing results of height and critical frequency measurement are included. (*Same item as* 6D–24, *Met. Abstracts.*) *Subject Headings:* **1. Ionospheric disturbances 2. F2 layer 3. Auroral effects.**—*A.M.P.*

12A–157 551.594.51:535.33

Meinel, A. B., **Report on auroral studies in the red and infrared regions from 1948 to 1951.** *I.U.G.G. Association of Terrestrial Magnetism and Electricity, Brussels, 1951, Transactions,* pub. **1954.** p. 253–254. 7 refs. **DWB**—The auroral observations conducted at the Lick Observatory and the Yerkes Observatory are briefly reported. The observations were made by a grating spectrograph of high wave length resolution and light gathering power. The observations made at Lick Observatory on Aug. 7, 1948 showed for the first time the presence of strong permitted lines of OI at 7774A and 8446A and of NI at 8684–8714A. Spectra obtained of the auroral storm of Aug. 18 and 19, 1950 at the Yerkes Observatory showed that the group of emissions to the red of the (2,0) band of the first positive system of N_2 are not due to high vibrational transitions of the $\Delta v = 1$ sequence of this system. *Subject Headings:* **1. Auroral spectra 2. Red auroral line 3. Infrared auroral line.** —*I.S.*

12A–158 550.594.5

Meinel, A. B. (*Yerkes Obs., Univ. of Chicago*), **The morphology of the aurora.** *National Academy of Sciences, Chicago, Proceedings,* 40(10):943–950, Oct. **1954.** 7 figs. **DWB**—This article discusses and illustrates the general nature of the aurora, the difficulty in photographing the phenomenon—especially in obtaining spectral photographs which often require several hours exposure, involving danger of mixed forms occurring—modern photographic or spectrographic equipment which allows isolated spectrophotographs of unmixed phases—hope that IGY will enable simultaneous spectrophotographs to be made at distant points. Latitude and hemispheric relations or variations, laboratory equipment which simulates changes in phase from that of the homogeneous arc (of extraterrestrial origin) to the rayed structure and sometimes pulsating draperies on patches, during which time the hydrogen (Ha) lines fade and high speed electrons accelerated to 50–200 ev and originating in the atmosphere take over. More can be learned. (*Same item as* 8.9–324, *Met. Abstracts.*) *Subject Headings:* **1. Auroral morphology 2. Auroral photography.**—*M.R.*

12A–159 551.594.5

Meinel, A. B. (*Yerkes Obs.*), **Systematic auroral motions.** *Astrophysical Journal,* Chicago, 122(12):206–208, July **1955.** fig., 6 refs. **DWB, DLC**—A reply to criticism of McLaughlin (*see* 6.7–342, July 1955, *Met. Abstracts*), Meek (*see* 7.4–298, April 1956, *Met. Abstracts*), and Bless, Gartlein and Kimball (1955) who deny the conclusions of Meinel and Schulte (1953) that there is a distinct time relationship in direction of motion of auroral rays, etc. Meinel claims that there may not be an exact or detailed local time relationship, but merely a systematic relation which may be hard to detect by the naked eye. The idea that the excitation pattern may reverse itself at noon and midnight is generally accepted but the idea of mass motion is harder for some to accept. The author maintains that evidence exists for such mass motions (electrojet stream) and illustrates a theoretical current system and two actual current systems schematically. (*Same item as* 7.5–252, *Met. Abstracts.*) *Subject Headings:* **1. Auroral drift 2. East-west auroral motion 3. Ionospheric winds 4. Electrojet stream theory.**—*M.R.*

12A–160 551.594.52:551.590.21
Meinel, A. B.; Negaard, B. J. and Chamberlain, J. W., **Variation of the 27-day recurrence period for low-latitude aurorae.** Chicago Univ. Yerkes Observatory, Williams Bay, Wisc., Contract AF 19(122)-480, Technical Report, No. 14, July 29, **1955.** 4 p. 2 figs.—An earlier statistical study of the recurrence periods of low-latitude auroras has been extended in an attempt to ascertain any variations in the solar-rotation (27-day) recurrence period through the solar cycle. The data are divided according to minimum and maximum years and according to the first and second halves of the solar cycles. Some changes during the cycle are suggested by the data, but an insufficient number of observations is available to make any conclusions definite. (*Same item as* 7.10–302, *Met. Abstracts.*) *Subject Headings:* **1. Low latitude auroras 2. Auroral-solar relationships.**—*A.A.*

12A–161 551.521.326:551.594.51
Meinel, A. B. (*Natl. Astron. Obs. & Yerkes Obs., Williams Bay, Wis.*), **Airglow and aurora.** *Smithsonian Contributions to Astrophysics*, Wash., D. C., 1(1):95–97, **1956.** 8 refs. **DWB, DLC**—ÅNGSTRÖM first observed and measured the wave length of the green auroral line in 1867. Since then many observers have been making remarkable observations in order to determine the light of the night sky and the auroras. This paper describes the appearance of the light of the night sky on the spectrum of a faint astronomical object. The characteristics of $\lambda\lambda 4800$–3100 spectrum, the region $<\lambda 3500$ and airglow spectrum $<\lambda 6500$–4200 are also discussed. It is hoped that more data on airglow and auroras will be collected during IGY. (*Same item as* 10.6–204, June 1959, *Met. Abstracts.*) *Subject Headings:* **1. Night airglow 2. Auroras.**—*N.N.*

12A–162 551.501.81:551.594.5
Meos, Johan and Olving, Sven, **On the origin of radar echoes associated with auroral activity.** *Göteborg, Sweden. Chalmers Tekniska Högskola, Handlingar*, No. 196, **1958.** 20 p. 14 figs., table, **21** refs. **DLC**—Until very recently it has been accepted that most of the VHF radio echoes obtained near the polar regions during geomagnetic storms were due to direct scatter from auroral displays. HARANG and LANDMARK (1954) however, have published a paper where they explain the echoes as backscatter from land or sea via intense sporadic ionospheric layers in the E region. An analysis of the echoes at 10 m wave length, recorded at the Kiruna Radio Wave Propagation Observatory during the first quarter of 1953, indicates that the echoes cannot be disconnected from aurora borealis. It is concluded that the predominant mechanism is closely connected to ionized and often invisible auroral forms. (*Same item as* 9H–129, *Met. Abstracts.*) *Subject Heading:* **1. Radar echoes from auroras.**—*From authors' summary.*

12A–163 551.510.535:621.396:551.594.5
Merritt, Ernest and Bostwick, William E., **A visual method of observing the influence of atmospheric conditions on radio reception.** *National Academy of Sciences, Wash., D. C., Proceedings*, 14(11):884–888, Nov. **1928. DLC**—The experiment described is that of a partial separation of the ground waves and the sky wave in radio communication. Two balanced coils were used (A and B). The A coil mounted with its plane vertical and directed toward the sending station, the B coil in vertical plane at right angles to this direction. The latter coil responds only to that component of the sky wave which is polarized with its electric vector horizontal and is not affected by the ground wave. Suitable amplification to one pair of plates of a cathode ray oscilloscope featuring respectively horizontal and vertical movements, combination of which results in a Lissajous figure on the screen. An example of the method as used during the presence of aurora is described. Further studies especially during sunset are contemplated. (*Same item as* 6D–10, *Met. Abstracts.*) *Subject Headings:* **1. Radio wave propagation 2. Auroral effects on radio wave propagation.**—*W.N.*

12A–164 551.510.53 551.594.5
Millman, Peter M., **Upper atmosphere and current research.** *Royal Astronomical Society of Canada, Journal*, 51(6):334–340, Dec. **1957.** 2 figs. **DLC**—A review of research on the upper atmosphere reported at the Boulder, Colo., assembly of the U.R.S.I. (XII) and the Toronto Assembly of the I. U. G. G. (XI), in August and Sept. 1957, respectively. Subjects of particular interest dwelled on are: 1) Whistlers, 2) Ozone, 3) Airglow, 4) Auroral temperatures, 5) Auroral cameras, 6) Fine structure of the ionosphere, 7) Ionospheric winds 8) Meteor ionization, 9) Meteor velocities. (*Same item as* 10.7–183, *Met. Abstracts.*) *Subject Headings:* **1. Upper atmosphere research 2. Ionospheric research 3. Auroral research 4. Whistler research.**—*M.R.*

12A-165 551.594.5(470)

Mironov, A. V.; Prokudina, V. S. and Shefov, N. N., **Nabliudenie poliarnogo siianiia 10-11 fevralia 1958 g. pod Moskvoĭ.** [Observation of the aurora of Feb. 10-11, 1958 near Moscow.] (In: Krasovskiĭ, V. I. (*ed.*), **Spektral'nye, elektrofotometricheskie i radiolokatsionnye issledovaniia poliarnykh siianii i svecheniia nochnogo neba.** Issued Moscow, Akademiia Nauk SSSR, **1959.** p. 21-31. 9 figs., table, 9 refs.) English transl. by J. Miller issued by American Meteorological Society, July 1959, under Contract AF 19(604)-1936, as its Transl. T-RC-14+.—The results of treatment of the auroral spectrograms in the regions 3400 6600, 8000-9400, 9800 11200 Å obtained on Feb. 10 11, 1958, at the Zvenigorod station are reported. Strong enhancement of the emission at λ10830 Å is registered as compared to the usual intensity of the Q-branch of the OH (5,2) band. This enhancement is apparently due to the appearance of the He I emission. *Subject Headings:* **1. Auroral observations 2. Moscow, U.S.S.R.**—*Authors' abstract.*

12A-166 535.41:551.594.5:551.521.326

†Muliarchik, T. M., **Interferometricheskie izmereniia temperatury verkhneĭ atmosfery po shirine nekotorykh emissionnykh liniĭ.** [Interferometric temperature measurement of the upper atmosphere based on the width of some emission lines.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 3:449-458, March **1960.** 5 figs., 25 refs. Russian summary p. 449. **DLC.** Transl. into English in the corresponding number of the English language ed. of the **Izvestiia,** *Bulletin of the Academy of Sciences, USSR, Geophysics Series.*—The results of measurements of the contours of several emission lines of the upper atmosphere obtained by means of the interferometer are presented. The contents of this paper include the following: a discussion of the applicability of the interferometric method to the measurement of the temperature of the upper atmosphere during illumination of the night sky, polar auroras and twilight flares; a review of the literature on interferometric measurement of the temperature of the upper atmosphere; a description of the interferometer with the aid of a diagram and the method of its operation; determination and values of the instrumental contours; and the results of measurements of contour lines λ5577 Å (OI), 6300 Å (OI) and of line width λ5200 Å (NI) under conditions of illumination of the night sky, polar auroras and twilight flares are presented. A comparison of the temperatures measured according to lines λ5577 and 6300 Å at different latitude indicates that the upper atmosphere apparently experiences a heating at higher latitudes. *Subject Headings:* **1. Interferometry of aurora and airglow 2. Upper atmosphere temperature measurement techniques 3. Emission line temperatures.**—*I.L.D.* Ⓢ

12A-167 551.521.18:551.594.51

Murcray, Wallace B., **A possible auroral enhancement of infra-red radiation emitted by atmospheric ozone.** *Nature*, London, 180(4577):139-140, July 20, **1957.** 2 refs. **DWB**—Nocturnal atmospheric emission in near infrared on 9.6μ increased by 18% at 11.55 p.m. on March 26, 1957, immediately after an aurora had moved into the field of the instrument. (*Same item as* 8.10-159, *Met. Abstracts.*) *Subject Headings:* **1. Infrared radiation 2. Auroral radiation.**—*C.E.P.B.*

12A-168 551.594.5:535.24

Murcray, W. B., **Photometric studies of auroral luminosity and its connection with some atmosphere ionization phenomena.** Alaska. Univ. Geophysical Institute, Contract AF 19(604)-1859, Scientific Report No. 2, Sept. **1958.** 13 p. 3 figs., 12 refs. **DWB** (M94.6 A323sci)—The auroral radiation, 3914 Å, received from the entire sky on a horizontal diffusing plate was monitored continuously during the nights of 1955-56 and 1956 -57. The 1955-56 data and part of the 1956-57 data were used to obtain a diurnal curve for the sky luminosity in this wavelength. The auroral light increases to a broad maximum which lasts from magnetic midnight till dawn. The luminosity was found to correlate fairly well with absorption as inferred from F-min values and with $(FE_s)^2$ and very well with the magnetic K indices. *Subject Headings:* **1. Auroral intensity variations 2. Auroral-geomagnetic relationships 3. Diurnal auroral variations.**—*Author's abstract.*

12A-169 551.510.535:551.594.5:551.594.12:621.396.8

Nakata, Yoshiaki (*Radio Res. Lab. Kokubunji*), **Auroral echoes in the ionograms obtained in the minauroral region.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan,* 12(1):1-5, **1958.** 6 figs. (incl. photos), 6 refs. **DWB, DLC**—A report of the radio echoes believed to be from auroral ionization obtained at a minauroral region (Japan) 3 times since the beginning of IGY by a continuously operated newly designed ionosonde. The instrumental details of the ionosonde are presented. These auroral echoes occurred on the magnetically disturbed days of 13 and 21 Sept., 1957 and of 11 Feb., 1958. The details of these echoes are discussed and their photographic representations shown. In order to indicate the source of these echoes, the relation between the calculated slant range and ionospheric height is considered and graphically represented. In this regard, evidence obtained at Kokubunji indicates that the echoes from auroral ionization have been obtained in fact from scattering source located at F layer heights. *Subject Headings:* **1. Radio echoes from auroras 2. Auroral-ionospheric relationships 3. Japan.**—*I.S.*

12A–170 551.515.4:551.593(492) 551.594.5

*Netherlands. Meteorologisch Instituut, **Onweders, optische verschijnselen, enz. in Nederland: naar vrijwillige waarnemingen.** [Thunderstorms, optical phenomena, etc. in the Netherlands: voluntary observations.] Vol. 1, **1880(?)**– Latest issue seen, Vol. 72, **1951.** pub. 's-Gravenhage, **1955.** figs., tables. (Its *Pub.* No. 81.) **DWB** (M82.1/192 N469o)—Each annual report gives tabular and textual data on all manner of miscellaneous phenomena reported by about 150 cooperative weather stations in the Netherlands. Station location maps and index, detailed tabulations of thunderstorms by months compared with long period averages, data on hail, waterspouts or tornadoes, ball lightning, St. Elmo's fire, halos, auroras, nacreous and noctilucent clouds, rainbows and other similar phenomena are presented separately and discussed in chronological order under each major heading. (For 1944 issue, *see* 2.5–182, May 1951, *MAB.*) (*Same item as* 10.2–209, *Met. Abstracts.*) *Subject Headings:* **1. Thunderstorm data 2. Optical phenomenon data 3. Auroral data 4. Netherlands.**—*M.R.*

12A–171 551.594.5:551.521.64:523.75

†Newton, H. W. and Piggott, W. R., **Observational aspects of solar corpuscular radiation.** *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Paris, **1954.** p. 101–111. fig., tables, 86 refs. **DWB**—Observations of flares and magnetic storms during the declining phase of the last sunspot cycle are listed. The solar phenomena, especially radio noise, accompanying the emission of corpuscular streams, the direct detection of such streams and their effects on the ionosphere, aurora, geomagnetism, etc. are discussed. (*Same item as* 9I–45, *Met. Abstracts.*) *Subject Headings:* **1. Corpuscular radiation effects on auroras 2. Solar flares.**—*C.E.P.B.*

12A–172 551.594.51:551.594.12:551.510.535

Nichols, Benjamin (*Geophys. Inst., Univ. of Alaska, College, Alaska*), **Drift motions of auroral ionization.** *Journal of Atmospheric and Terrestrial Physics,* London, 11(3/4):292 293, **1957.** fig., 3 refs. **DLC**—Drifts 400–900 km N. of College, Alaska were measured in VHF ranges (106 and 41.15 Mc/s) from transmitters located 40 km E. of College. Movement of echoes from auroral ionization in the E region are probably due more to the speed of electrons in the disturbance current system than to ionospheric winds. Recent ionization data would indicate a total current of 10^5 A/100 km of lat., in accordance with currents calculated from magnetic observations by SILSBEE and VESTINE (1942) and others. Radar echoes, spread over a range of 100 km, are also consistent with electron density, drift velocity and magnetic observations. (*Same item as* 10.3–332, *Met. Abstracts.*) *Subject Headings:* **1. Auroral ionization drift measurements 2. Auroral ionization of E layer 3. College, Alaska.**—*M.R.*

12A–173 551.594.51:551.594.12:550.385.4

†Nichols, Benjamin, **Auroral ionization and magnetic disturbances.** *Institute of Radio Engineers, N. Y., Proceedings,* 47(2):245–254, Feb. **1959.** 3 figs., 56 refs. **DLC**—An examination of radio studies of auroral ionization shows that an average ionization density of about 5×10^5 electrons per cm^3 is sufficient to explain the normal radar echo. The magnetic disturbances produced by current systems in the ionosphere are closely related both to the ionization and the luminosity of the aurora. The magnetic variations are also associated with increases in the speeds of motion of the ionization. The increased ionization manifest in the aurora, together with its increased speed of motion, brings about the magnetic changes observed at the ground. The rapid speeds of auroral motions observed both visually and by radio means are at the upper end of a continuous curve of drift motions that increase with increasing magnetic disturbance. (*Same item as* 11.8–96, *Met. Abstracts.*) *Subject Headings:* **1. Auroral ionization 2. Magnetic storms and auroras 3. Radar echoes from auroras 4. Auroral drift.**—*Author's abstract.*

12A–174 551.501.1:551.594.5

Nicolet, M., **Instructions pour l'observation visuelle des aurores au cours de l'Année Géophysique Internationale.** [Instructions for the visual observation of auroras during the International Geophysical Year.] *Ciel et Terre,* Brussels, 73(11/12):527–545, Nov./Dec. **1957.** 10 figs., table. **DLC**—Instructions to voluntary observers who will participate in the global network of auroral observation. This note contains illustrated descriptions of the principal auroral forms, directions to those observers able to make hourly observations and to those who cannot follow such a strict schedule and, finally, instructions for detailed observation of the important auroral phenomena. The observation should particularly comprise the form, height, direction, color, brightness and activity of the aurora. (*Same item as* 9.9–47, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observation program 2. IGY auroral program.**—*A.V.*

12A–175 551.594.5

Nordlichtbeobachtung. [Aurora observation.] *Zeitschrift für Meteorologie*, 11(2):60–61, Feb. **1957.** 6 figs. **Weitere Nordlicht-Beobachtungen vom 21.–22.1.1957.** *Ibid.*: 62–63. **DLC**—The staff of Fichtelberg Observatory, 50°26′N, 12°57′E, report fully on an intense aurora on Jan. 21–22, 1957 (18 h 30 m–0 h 30 m). Short reports are included from Inselsberg, Altenburg, Wittenberg and Olbersdorf/Sa. (*Same item as* 9.6–286, *Met. Abstracts.*) *Subject Heading:* **1. Auroral descriptions.** —*C.E.P.B.*

12A–176 551.594.5 551.510.534:546.214

*Norske Institutt for Kosmisk Fysikk, **The Auroral Observatory at Tromsö ($\varphi = 69°39'.8$N, $\lambda = 18°56'.9$E Gr.). Observations 1952.** Its *Publikasjoner*, No. 35, pub. **1954.** 31 p. graphs, 4 figs., numerous tables. **DWB**—A brief description of the auroral and twilight sodium research (spectrograph observation) at Tromsö and Oslo, and ozone observations at Tromsö (9 months) and Longyear, Spitsbergen (7 months) with a Dobson spectrophotometer. The Longyear observations were started in Sept. 1950 by S. H. H. LARSEN. The results of the first 2 years of observation there will be published in a separate paper. Following the 1-page discussion are tables of O_3 values for each day of the observation period in 1952. Geomagnetic observations at Tromsö and Bear Island; radio echo observations and hourly ionospheric values of critical E, *Fo*E, and F1, F2 and vertical height, storminess horizontal and vertical intensity and storminess values for each hour of the year are tabulated and shown in graphs. (*Same item as* 8.1–114 and 10F–16, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Ozone data 3. Twilight Na 4. Geomagnetic data 5. Ionospheric data 6. Tromsö, Norway 7. Longyear, Spitsbergen. I. Tromsö, Norway. Nordlysobservatoriet.**—*M.R.*

12A–177 551.594.5

O'Brien, B. J.; Van Allen, J. A.; Roach, F. E. et al., **Correlation of an auroral arc and a subvisible monochromatic 6300 A arc with outer-zone radiation on Nov. 28, 1959.** *Journal of Geophysical Research*, Wash., D. C., 65(9):2759–2766, Sept. **1960.** 5 figs., 8 refs. **DLC**—During a severe geomagnetic storm on Nov. 28, 1959, two Geiger tubes on satellite Explorer VII (1959) found anomalies in the outer radiation zone at an altitude of about 1000 km which appear to be correlated in space and time with optical emissions from the atmosphere beneath. Very intense narrow zones of radiation were detected over a visible aurora during one pass. The radiation in three such zones was harder toward low latitudes. On three subsequent passes the radiation zone was deduced to be over a subvisible 6300 A arc, whose brightness diminished as the radiation zones became less intense. The correlation is discussed. *Subject Heading:* **1. Auroral arcs. I. Gartlein, C. W.**—*Authors' abstract.* Ⓢ

12A–178 551.594.51:535.33

Omholt, A., **The red and near-infra-red auroral spectrum.** *Journal of Atmospheric and Terrestrial Physics*, 10(5/6):320–331, **1957.** 3 figs., 3 tables, 27 refs., 4 eqs. **DWB**—Six auroral spectra covering the wave length range 5400–8800 Å have been subject to thorough intensity measurements. The intensity distributions in the First Positive band system and the Meinel band systems were measured and related to theoretical data. The altitude variations of these band systems and the strongest oxygen lines and bands were studied, the intensity ratio between the red [OI] lines λ6300/64 and the First Positive bands being taken as an indication of relative altitude. An auroral feature detected at 7325 Å on spectra from high altitudes is tentatively identified as the [OII] multiplet ^2D-^2P. The intensity distribution and its variation with altitude are briefly discussed. (*Same item as* 8.10–301, *Met. Abstracts.*) *Subject Heading:* **1. Auroral spectra.**—*Author's abstract.*

12A–179 551.594.5:551.590.21

Owren, Leif, **Het poollicht.** [The aurora.] *Hemel en Dampkring*, The Hague, 53(11):197–198, Nov. **1955.** 2 colored plates. **DLC, DWB**—The author describes the appearance of the aurora borealis, considers the time and place where it is best seen and discusses the relationship between the aurora and solar activity, origin of the aurora and its effects upon the earth. Two color photographs of auroras are included in this article. (*Same item as* 9.6–287, *Met. Abstracts.*) *Subject Headings:* **1. Aurora borealis 2. Auroral photographs 3. Auroral-solar relationships.**—*I.L.D.*

12A–180 621.396:551.510.535:551.594.5

*Owren, Leif; Leinbach, Harold and Nichols, B., **Auroral zone absorption of radio waves transmitted via the ionosphere.** Alaska. Univ. Geophysical Institute, Contract DA-36-039-sc-56739, Final Report (on Task A and B), March 1, 1955 to Feb. 29, **1956.** 79 p. 28 figs., 19 tables. **DWB**—Gives a detailed account of experimental data collected under Experiment Aurora. The monthly percentage of signal-in-time is tabulated for all frequencies and paths and compared with East-West and South-North propagation at each frequency. The seasonal variation in signal-in-time over short and long paths is shown in diagrams. There is a significant difference statistically in signal-in-time for the East-West and North-South Paths for 12 mc short paths. A study of the critical frequencies for E and F layers shows the difference in daytime variation of median signal strength between the years 1949–50 and 1954–55 due to changes in F layer ionization and D layer absorption in the course of a sunspot cycle. With a 12 mc radar, both direct back-scatter and ground-scatter echoes were observed over a period of many months. Two types of echoes were recorded, one of which fades very rapidly. The data obtained about visual aurora at five stations in Alaska are analyzed. *Subject Headings:* **1. Auroral effects on radio wave propagation 2. Radio echoes from auroras. I. Stark, R. II. Smith, Carol.**—*A.H.K.*

12A–181 551.594.5

*Parsons, N. R. and Fenton, K. B., **Observations of the aurora australis, Macquarie Island, May 1950 April 1951.** *Australian National Antarctic Research Expedition, 1947 1949, Interim Reports*, No. 5, Jan. **1953.** 338 p. 6 refs. **DLC**—A compilation of detailed auroral observations begun on May 1, 1950 at Macquarie Island (61°S mag.; 54°29′S, 158°58′E, geog.), and made from sunset to sunrise on all nights. Changes in form, location and intensity are recorded. A clinometer was used for elevation and a small hand spectroscope for determining presence of auroras on overcast or moonlight nights or during twilight. Auroras were observed on 206 nights, or 86% of possible nights during the year. Notes include sample photographs, and a summary of observations of internal motion of rays on 21 nights during year (May 1950–April 1951), and of homogeneous arcs on the remaining nights. It is believed that these data confirm suspicion that the maximum auroral belt is nearer Macquarie Island than was believed previously (based on 1913 data—a year of minimum activity). (*Same item as* 8.3–23, *Met. Abstracts.*) *Subject Headings:* **1. Aurora australis data 2. Macquarie Island.**—*M.R.*

12A–182 551.501:551.594.5

†Paton, James, **The observation of aurora.** *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Paris, **1954.** p. 157–167. 33 refs. **DWB**—Early maps of isochasms are based on inadequate data and close networks of observing stations have been recently established, supplemented by observations on transatlantic stratocruisers. Aids to observing, analysis and classification are described; use of punched cards is suggested. Use of radio echoes is discussed. The paper ends with a list of outstanding problems. (*Same item as* 7.4–299, *Met. Abstracts.*) *Subject Heading:* **1. Auroral observation programs.**—*C.E.P.B.*

12A–183 551.594.5:523.78

Paton, J., **An attempt to observe daytime aurora.** *British Astronomical Association, London, Journal*, 64(8):376–378, Oct. **1954.** **DWB**—Sky was scanned from an airplane flying east along central line of eclipse of June 30, 1954, with polaroid filters with transmission on 5577, 6300 and 4273 Å. No trace of aurora was seen. (*Same item as* 6.6–340, *Met. Abstracts.*) *Subject Heading:* **1. Solar eclipse aurora.**—*C.E.P.B.*

12A–184 551.594.5

Paton, James and McInnes, Bennet, **List of auroral occurrences 1951–53.** *British Astronomical Association, London, Journal*, 64(8):393–395, Oct. **1954.** **DWB**—Nights when auroras were observed from places in and south of geomagnetic latitude 63° between geom. long. 70–90°. (*Same item as* 6.6–341, *Met. Abstracts.*) *Subject Heading:* **1. Auroras.**—*C.E.P.B.*

12A–185 551.506.22:551.594.5

Paton, James, **Polar and tropical aurorae.** *Endeavour*, London, 16(61):42–46, Jan. **1957.** 5 photos, 11 refs. **DLC**—A general discussion, with fine illustrations, of the occurrence and theories as to the cause of the airglow, the polar aurora and the tropical aurora, and methods of observation and photography. Special attention is paid to the IGY auroral program. (*Same item as* 8.8–39, *Met. Abstracts.*) *Subject Headings:* **1. Auroras 2. IGY auroral program.**—*M.R.*

12A–186 551.506.22:551.507.22:551.594.5

Paton, J. (*Balfour Stewart Auroral Lab., Univ. of Edinburgh*), **The contribution of observers in ships to auroral research during the International Geophysical Year.** *Marine Observer*, [London], 28(181):147–148, July **1958.** **DLC**—All auroral observations made over the Atlantic, Europe and

Africa during the IGY are stored at the Balfour Stewart Auroral Laboratory. The most notable of the occurrences of aurora were those on the nights of Sept. 29–30, 1957, and Feb. 10–11, 1958. The report describes the reduction and the analysis of the auroral data, as well as the future of the aurora observation program. *Subject Headings:* **1. IGY auroral program 2. Auroral observations from ships.**—*N.N.*

12A–187 551.594.5

Paton, James, **Aurorae seen in daylight.** *British Astronomical Association, Journal,* 70(3):147–148, March **1960. DWB, DLC**—Describes an aurora observed on the night of 3–4 Sept. 1959. The observation was similar to one described by MISS C. M. BOTLEY in the *British Astronomical Association, Journal,* 69, 222–224, **1959.** The resemblance of crepuscular rays to an aurora is so close that an observer may suspect he is seeing a daylight aurora when he is actually observing crepuscular rays. *Subject Headings:* **1. Auroral descriptions 2. Daylight auroras.**—*A.H.K.* Ⓢ

12A–188 551.521.326:551.594.51:535.33

Pearse, R. W. B. (*Imperial College, London*), **The spectrum of the night sky: some problems in the identifications.** (In: International Conference on the Emission Spectra on the Night Sky and Aurorae, London, 1947, **Papers, 1948.** p. 12–15. 14 refs.) **DWB**—Night sky spectrum contains a yellow (sodium) line in addition to the red and green auroral lines even when no aurora is visible. Recently feeble radiations of over 100 wave lengths in blue and violet, and as many again in ultraviolet between 3900 and 3100 Å have been discovered in night sky spectra, and are almost constant in both intensity and spectral composition in all parts of the earth and in all directions. Oxygen lines appear in both auroral and night sky spectra, but N_2^+ and N_2 only in auroral activity. Difficulties in attempting to compare spectra with so many feeble lines and bands, or to identify them with laboratory spectra of known origin, are cited. Presence of CO to account for $w' = 2560$ is not sure. (*Same item as* 5.4 127, *Met. Abstracts.*) *Subject Headings:* **1. Night airglow spectrum 2. Auroral spectra 3. Carbon monoxide in atmosphere 4. Spectroscopy.**—*M.R.*

12A–189 551.501.89:551.594.51

Peterson, A. M. and Leadabrand, R. L. (*Radio Propagation Lab., Stanford Univ., Calif.*), **Long-range radio echoes from auroral ionization.** *Journal of Geophysical Research,* Wash., D. C., 59(2): 306–309, June **1954.** 2 figs. **DLC**—Radio echoes were observed at 1600 to 4700 km from Stanford Univ. (43.75°N) on frequencies of 6.42, 12.86 and 17.31 Mc at greater heights than heretofore reported, and with intensities exceeding strongest F layer propagated ground-scatter echoes occurring simultaneously. These echoes were first detected in Oct. 1952 during sporadic E layer studies, they are found in the F layer, not E layer zone as was presumed. Discrete and diffuse echo records are reproduced. Several layers may be present at varying distances. Diurnal and seasonal frequencies agree with auroral frequency data. (*Same item as* 6D–257, *Met. Abstracts.*) *Subject Headings:* **1. Radio echoes from auroras 2. Stanford Univ., Calif.**—*M.R.*

12A–190 551.594.51:546.17

Petrie, W. (*Radio Physics Lab., Defence Res. Board, Ottawa*), **Rotational temperature of auroral nitrogen bands.** *Journal of Atmospheric and Terrestrial Physics,* London, 4(1/2):5–9, **1953.** 4 figs., 11 refs., 11 eqs. **DWB**—Auroral spectrograms of dispersion 42–28 A/mm have been analyzed with a recording microphotometer. Rotational temperatures were determined from the profiles of VEGARD-KAPLAN and Negative Group nitrogen bands, and found to be in the range 450–750°K. It now appears that spectroscopic, rocket and radio results are in reasonable agreement. (*Same item as* 7.3–294, *Met. Abstracts.*) *Subject Headings:* **1. Rotational temperatures 2. Auroral zone temperatures 3. Auroral nitrogen bands.**—*Author's abstract.*

12A–191 551.594.51:535.33:551.521.17

Petrie, W. and Small, R. (*Univ. of Saskatchewan*), **The intensities of ultraviolet features of the auroral spectrum.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers,* No. 30:61–73, July **1954.** fig., 5 tables, 15 refs., 4 eqs. Discussion p. 69–72. **DLC**—Twenty-eight ultraviolet spectra of the aurora have been secured at Saskatoon, using a single-prism quartz spectrograph. Fifteen of these plates have been analyzed with a microphotometer and intensitometer and integrated relative intensities have been obtained of the main spectral features. The intensities have been corrected for the effects of Rayleigh scattering and ozone absorption. The corrected intensities are carefully discussed and it is shown that they yield vibrational temperatures less than 500°K. This temperature value is different from earlier results, and additional measurements are desirable. (For shorter version, *see item* 4.2–289, Feb. 1953, *MAB.*) (*Same item as* 6.9–334, *Met. Abstracts.*) *Subject Headings:* **1. Auroral spectra 2. Ultraviolet intensities 3. Ozone absorption 4. Saskatoon, Saskatchewan.**—*Authors' abstract.*

12A–192 551.501(26):551.594.5:550.3:061.3

Polarlicht-Beobachtungen im Internationalen Geophysikalischen Jahr 1957 1958. [Auroral observations in the IGY, 1957–58.] *Wetterlotse,* Hamburg, No. 113:41–48, 55–56, Feb. **1957.** **DLC**—Aurora especially calls for observational collaboration of sailors during the IGY. Being a period of maximum sunspot activity, aurora can be expected occasionally in low latitudes during especially intensive solar outbreaks, and such observations are needed. Instructions for auroral observations at sea are given. (*Same item as* 8.6–110, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observation program. 2. Marine observation 3. International Geophysical Year program.**—*C.E.P.B.*

12A–193 551.594.5

Poliarnoe siianie 21 22 ianvaria 1957 goda. [Aurora of Jan. 21 22, 1957.] *Priroda,* Moscow, 46(12):83–85, Dec. **1957.** photo. **DLC**—This is a review of information on the aurora described by a number of eye witnesses from the Moscow, Sumy (Ukraine), Yaroslovl and Murmansk Oblasts and mailed to the Murmansk branch of NIZMIR (Scientific Research Institute of Terrestrial Magnetism, Ionosphere and Radio-wave Propagation). The aurora was an outstanding geophysical phenomenon. Its origin was linked to an increase of solar activity. Its characteristic feature was the pre-eminently red color in more southern regions, which indicates its great height and its increased intensity. The aurora was accompanied by a very intensive ionospheric-magnetic disturbance and an interruption of radio communication on almost all lines. (*Same item as* 10.5–341, *Met. Abstracts.*) *Subject Headings:* **1. Aurora of Jan. 21–22, 1957 2. U.S.S.R.**—*A.M.P.*

12A–194 551.510.535:551.594.51

Rawer, Karl, **Sporadic E ionization.** *International Council of Scientific Unions. Mixed Commission on the Ionosphere, 2nd Meeting, Brussels, Sept. 1950, Proceedings,* pub. **1951.** p. 114–119. 12 refs. **DWB**—A strong correlation exists between the magnetic disturbances in the auroral zone and (E aurora) ionization at the height of the auroral zone, whereas no such correlation exists between Es (sporadic E layer disturbances) in lower latitudes and magnetic storms. Es data for 40 days (April–Oct. 1944) at 3 stations in Germany and one at Athens (360, 720 and 1800 km apart) were correlated and usually a positive correlation was found. Small, high ionized counters are found in the Es layer. (*Same item as* 5.7–79, *Met. Abstracts.*) *Subject Headings:* **1. Sporadic E layer (Es) 2. Auroral layer ionization.**—*M.R.*

12A–195 551.510.53:016

†Resnick, Robert and Stein, Stanley, **The spectra and chemical kinetics of the upper atmosphere. A literature survey.** Pittsburgh. Univ. Spectroscopy Laboratory, Contract AF 19(122)-478, Scientific Report, No. 1, Pts. 1–6, Oct. 31, 1952–Aug. 10, **1953.** 6 pieces. **DWB**—Contents: Pt. 1, Subject classification; Pts. 2–4, Author classification; Pt. 5, Subject classification (of supplementary material); Pt. 6, Author classification (of supplementary material). This voluminous literature survey covers in detail the recent scientific treatises on airglow, atmospheric composition, auroras, ionospheric spectra, spectra and chemical kinetics of atmospheric particles, lightning, luminous clouds, meteors, solar influences, atmospheric pressure, temperature and meteors above 30 km and zodiacal light. A list of journals cited is appended to each part. Abstracts of varying lengths, taken mainly from **Physics Abstracts, Chemical Abstracts** and **Meteorological Abstracts and Bibliography,** are included with about $\frac{3}{4}$ of the citations in the author classification volumes (II, III, IV and VI). A list of abstractors is appended at the end of each of these volumes. At least 4000 items are included in the author and in the subject volumes. (*Same item as* 5.11–7 and 6B–168, *Met. Abstracts.*) *Subject Headings:* **1. Auroral bibliographies 2. Upper atmosphere bibliographies.**—*M.R.*

12A–196 551.521.326

Roach, F. E. (*U. S. Naval Ordnance Test Station*), **Diurnal and seasonal variation of the airglow.** *National Academy of Sciences, Proceedings,* 40(10):950–956, Oct. **1954.** 5 figs., 3 tables, 5 refs. **DWB**—Origin of night airglow spectral lines, intensities compared with aurora, diurnal variations in intensity in different parts of the sky, apparent motion across sky during night, seasonal variation, theories as to migratory motions and problems which can be solved during IGY are discussed and illustrated. Relation between night glow and aurora, and geographical variations in airglow can be determined by chains of observers from Alaska or Canada to Peru, and from N. Europe to S. Africa and Japan to Australia. Data used and illustrations are mainly from Sacramento Peak, N. Mex., and Cactus Peak, Calif. (*Same item as* 8B–111, *Met. Abstracts.*) *Subject Headings:* **1. Night airglow research 2. Night airglow network for IGY 3. Sacramento Peak, N. Mex. 4. Cactus Peak, Calif.**—*M.R.*

12A–197 551.594.5(783)

Roach, Franklin E. and Marovich, E. (*both, Natl. Bur. of Stands., Boulder, Colo.*), **Aurora of Oct. 22/23, 1958, at Rapid City, South Dakota.** *U. S. National Bureau of Standards, Journal of*

Research, Sec. D, 64(2):205–209, March/April **1960.** 8 figs., 12 refs. **DWB, DLC**—During the night of Oct. 22/23, 1958 auroral activity at Rapid City, South Dakota included (a) a visible aurora in the northern part of the sky; and (b) a "monochromatic" (6300 Å) arc through the zenith with an azimuth 12 from east-west (geomagnetic). The intensity changes of the arc were independent of the changes in the visible aurora. It moved slowly southward during the night corresponding to a linear speed of about 8 m/sec if its height is 300 km. It is suggested that it is a member of a family of monochromatic arcs which have until recently escaped detection because their red color makes them invisible even though intrinsically intense. (*Same item as* 11.8–100, *Met. Abstracts.*) *Subject Headings:* **1. Auroral descriptions 2. Auroral arcs 3. Subvisual auroras 4. Rapid City, S. Dak.**—*Authors' abstract.* Ⓢ

12A–198 551.594.5:551.521.326

Roach, F. E.; Moore, J. G.; Bruner, E. C., Jr., et al., **The height of maximum luminosity in an auroral arc.** *Journal of Geophysical Research*, Wash., D. C., 65(11):3575–3580, Nov. **1960.** 8 figs., 3 tables, 3 refs. **DWB, DLC**—The height of maximum luminosity of an auroral arc is estimated from simultaneous observations at three stations in western U. S. during a night of general auroral activity (Nov. 27–28, 1959). Photometrically this arc is characterized by a selective enhancement of the (OI) 6300 A line. From twenty-four individual measurements the height is found to be 412 km with a standard deviation of ±23 km for one observation and ±5 km for the mean. The geographical position of the arc, its orientation, and its movement during the night are discussed. *Subject Headings:* **1. Auroral luminosity 2. Auroral arcs. I. Cronin, H. II. Silverman, S. M.**—*Authors' abstract.* Ⓢ

12A–199 551.594.5:550.385

Rodewald, M. and Breitkreutz, Egon, **Das grosse Nordlicht vom 21. Januar 1957.** [The great aurora borealis of Jan. 21, 1957.] *Wetterlotse*, Hamburg, No. 113:48–54, Feb. **1957.** 4 figs. **DLC**—In 36°17′N, 6°46′W a red aurora penetrated by white rays. It was also seen in Portugal, Greece, Austria, Germany, etc. In Sweden strong magnetic disturbances caused traffic interruptions. Radio signals were inaudible. An aurora of Nov. 9, 1956 in 33°N 60°W is also referred to. (*Same item as* 8.6–367, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Geomagnetic disturbances.**—*C.E.P.B.*

12A–200 551.594.5(988,261)

Rodewald, Martin, **Nordlicht-Beobachtungen des MS. Nordland (Kapt. E. G. Steinbeck), 30.9.–14.10.1957.** [Auroral observations on the Nordland (Capt. Steinbeck) from Sept. 30–Oct. 14, 1957.] *Wetterlotse*, Hamburg, No. 124:226–231, Nov. **1957.** 2 figs. **DWB**—The paper contains three descriptions of northern lights observed by the crew of the motor ship "Nordland" in Sept. and Oct. 1957 at Port Churchill, Cape Farvel (South Greenland) and at sea during the trip to Hudson Bay. (*Same item as* 10.4–313, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. South Greenland 3. North Atlantic.**—*A.M.P.*

12A–201 551.594.5

Rodewald, Martin, **Ein starkes Südlicht.** [A bright aurora australis.] *Wetterlotse*, Hamburg, No. 135:200–202, Sept. **1958.** **DWB**—The observational data of the phenomenon which occurred July 8 and 9, 1958, and seen aboard M/S "Henriette Wilhelmine Schulte" 41°S, 92°E, are given in full here. *Subject Heading:* **1. Aurora australis data.**—*W.N.*

12A–202 551.594.5:551.510.535:621.396.1

Rumi, G. C., **Experiment Luxembourg.** Alaska. Univ. Geophysical Institute, Contract AF 19(604)-3880, Scientific Report, No. 2, May **1959.** 32 p. 12 figs., 13 refs. **DWB** (M(051) A323ex)—Auroral disturbances and the absorption of radio waves in the ionosphere have been investigated. The study shows that the absorption region is in two parts. In one of these layers the effective electron collision frequency increases during disturbed periods at auroral latitudes. This is attributed to auroral activity. The report concludes that at these auroral latitudes an auroral storm can even improve communications. *Subject Headings:* **1. Auroral-ionospheric relationships 2. Ionospheric absorption 3. Auroral zone disturbances.**—*N.N.* Ⓢ

12A–203 551.594.5:551.510.62

Rybner, Jorgen and Ungstrup, Emil, **L'influence de la zone d'aurores boréales sur les liaisons radioélectriques.** [Effect of the auroral zone on radio communication.] *Annales des Télécommunications*, Paris, 12(5):172–173, May **1957.** fig., 3 refs. **DLC**—Studies of high-frequency propagation between Denmark and western Greenland are reported. Considering all possible modes of propagation, it is found that the unusually weak field intensities observed may be attributed to D layer absorption in the auroral zone. (*Same item as* 9.5-278, *Met. Abstracts.*) *Subject Heading:* **1. Auroral effects on radio propagation.**—*G.T.*

12A-204 551.594.5 551.521.326

St. Amand, Pierre and Ashburn, E. V., **The frequency distribution of the intensity of aurorae and the night airglow for 5577 [OI].** *Journal of Geophysical Research,* 60(1):112-113, March **1955.** fig., 4 refs. **DWB**—Comparison of histograms of frequency of different intensities of nightglow (4 years at Cactus Peak, Calif, and similar one for southern France) and of aurora (College, Alaska) shows marked difference in frequency of intensity ranges and in nature of distribution of the two phenomena. An estimate is attempted of the probability that an aurora as weak as the strongest nightglow or a nightglow as bright as the weakest aurora would occur in Southern California and incidentally whether or not they are the same phenomenon. This probability is very remote in time of the order of thousands of years though data may not be absolutely comparable. (*Same item as* 6.11-358, *Met. Abstracts.*) *Subject Headings:* **1. Auroral intensities 2. Night airglow intensities 3. Cactus Peak, Calif. 4. College, Alaska.**—*M.R.*

12A-205 551.594.5

Sandner, W., **Nordlicht-Tage 1950 in Mitteleuropa.** [Aurora days in Central Europe during 1950.] *Sternenwelt,* Munich, 3(5/6):112-113, May/June **1951. DLC**—Conforming to a yearly practice followed by *Sternenwelt,* 16 auroras observed in Central Europe during 1950 are listed by date and place of observation. The aurora of Feb. 20, 1950 is described as the outstanding auroral display of the year, equal to the superb phenomena of 1938 and 1949. (*Same item as* 6.1-350, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Central Europe.**—*G.T.*

12A-206 551.594.52

*Sandner, Werner, **Häufigkeit und Periode der Nordlichterscheinungen auf Island und den Faer Oern.** [Frequency and period of the aurora in Iceland and the Faeroe Islands.] *Polarforschung,* Kiel, Ser. 3, 22(1/2):185-187, **1952,** pub. Aug. 15, 1954. tables. **DWB**—The analysis is based on a 30-yr (1893-1922) unbroken observational record of the phenomenon at 2 observation points in Iceland (Grimsey, 66°24′N and Vestmanö, 63°26′N) and 36 yrs data (1900-1935) at Thorshavn in the Faeroes (62°2.5′N). The results show: a) the mean yearly number of days with auroras, b) the earliest and c) latest dates of auroras during the period accounted for, d) the longest continous series of days with auroras, e) the number of days with auroras in every individual year of the period and f) the annual variation of aurora frequency calculated from the mean monthly number of days with aurora. It has been observed that a minimum of frequency occurs in mid-winter and a maximum at the time of the soltices. Further, that the peculiarity of illumination conditions in the Arctic produces a more clear aurora in the moderate latitudes, than in high latitudes. (*Same item as* 7.10 303, *Met. Abstracts.*) *Subject Headings:* **1. Auroral frequencies 2. Auroral data 3. Iceland 4. Faeroes.**—*A.M.P.*

12A-207 551.594.5

Sandner, Werner, **Häufigkeit und Periode der Südpolarlichter.** [Frequency and periodicity of aurora australis.] *Forschungen und Fortschritte,* Berlin, 27(5):134-136, Nov. **1953.** 2 tables, 5 refs. **DLC**—Monthly figures of aurora in New Zealand, Tasmania, and S of 40°S mostly show maxima in spring and autumn. Annual values 1931-42 run parallel to sunspot numbers; there is also a periodicity of about 27.7 days. (*Same item as* 6.1-349, *Met. Abstracts.*) *Subject Headings:* **1. Aurora australis 2. Auroral frequencies.**—*C.E.P.B.*

12A-208 551.594.52(99)

Sandner, Werner, **Polarlicht-Häufigkeit in Antarktika.** [Auroral frequency in Antarctica.] *Forschungen und Fortschritte,* 30(10):297-298, Oct. **1956.** table. **DLC**—Annual variation in Adélie Land (67°S, 141-140°E) Feb. 1950-Sept. 1952 is compared with New Zealand 1931-42. Antarctic frequency is naturally zero in summer, highest in May (14.3) and Sept. (10.3), compared with New Zealand maxima in Oct. (8.1) and March (7.1). There are periodicities of 27 and 57 days. (*Same item as* 8.2-324, *Met. Abstracts.*) *Subject Headings:* **1. Auroral frequencies 2. Antarctica.**—*C.E.P.B.*

12A-209 **551.594.51**:551.508.9

†Saskatchewan. Univ. Physics Dept., **Auroral research.** Contract AF 19(122)-152, Final Report, Aug. 15, **1956.** 34 p.—Report contains a list and abstracts of 38 articles or reports published under this contract in the field of auroral spectrometry, laboratory studies of auroral type emissions, auroral height measurements, sodium D-line (twilight) spectrometry and related subjects, plus an account of progress during the first half of 1956 in these fields. Equipment development includes a 9-inch and a 5-inch auroral spectrograph for use at the Univ. of Saskatchewan, Physics Building;

an infrared spectrometer (6000 Å to 20,000 Å); a patrol spectrograph for use over a wide portion of the spectrum and now being adapted for automatic recording; an auroral and night sky exposure register; a scanning spectrometer, etc. (*Same item as* 9.5–279, *Met. Abstracts.*) *Subject Headings:* **1. Auroral physics research 2. Auroral spectrometry 3. Auroral instruments 4. Saskatoon, Saskatchewan. I. Hunten, D. M. II. Jones, A. Vallance III. Currie, B. W.**—*M.R.*

12A–210 **551.594.5:551.501.81**

Schlobohm, J. C.; Leadabrand, R. L.; Dyce, R. B. et al. (*all, Stanford Res. Inst., Menlo Park, Calif.*). **High-altitude 106.1-Mc radio echoes from auroral ionization detected at a geomagnetic latitude of 43°.** *Journal of Geophysical Research*, Wash., D. C., 64(9):1191–1196, Sept. **1959.** 11 figs., table, 10 refs. **DLC**—Auroral echoes have been detected using a radar at 106.1 Mc located at 43° geomag. latitude. The geometry of reflection for ionization aligned with the earth's magnetic field lines is such that, for a geomagnetic latitude of 43°, reflection can occur as high as 300 km. The results of these observations are presented, with an interpretation of the height of reflections and a discussion of the advisability of making low-latitude auroral echo investigations. (*Same item as* 11.7–144, *Met. Abstracts.*) *Subject Headings:* **1. Radio echoes from auroras 2. Radar observation of auroras. I. Dolphin, L. T. II. Berg, M. R.**—*Authors' abstract.*

12A–211 **551.594.5:551.506.22**

†Schneider, Otto (*Inst. Antarc.. Argentina*), **Auroras australes vistas en el pasado desde la America del Sur y regiones Antarticas adyacentes.** [Southern auroras seen in the past from South America and adjacent Antarctic regions.] *Instituto Antartico Argentino, Buenos Aires, Contribucion*, No. 36, **1959.** 31 p. table, list of 252 auroras in tabular form (p. 14–29), 33 refs. Spanish and English summaries p. 4. **DWB** (M94.52 S359au)—Following a recommendation of the Western Hemisphere Conference for the IGY held in Rio de Janeiro, 1956, under the joint sponsorship of the Panamerican Institute of Geography and History, and the Comité Special de l'Année Géophysique Internationale, a search was begun for southern aurorae seen from South America, neighbouring oceans, and the opposite Antarctic area before the start of the IGY. Personal inquiries, bibliographic studies, and examination of observatory records, ship logs, and expedition reports were used to compile the material. The importance of such data for general geophysical research, especially in geomagnetism and aeronomy, is pointed out; then follows a list of aurorae found in the search, with references; some of the cases are described in detail. *Subject Headings:* **1. Aurora australis catalogs 2. IGY auroral program.**—*Author's abstract.* Ⓢ

12A–212 **551.594.5(09)(51)**

Schove, D. J. and Ho, P. Y., **Chinese aurorae, Pt. 1, A.D. 1048–1070.** *British Astronomical Association, Journal*, 69(6/8):295–304, Oct. 28, **1958.** 11 refs. **DWB, DLC**—Chinese auroras recorded in the Sung Dynastic History are presented. Aspects covered are: distribution in time; distribution and direction of displays; color and direction; the weak auroral maximum of circa 1052 compared with possible auroras in the British Isles; the moderate maximum of circa 1067 in China and Europe and finally, the four-week cycle. *Subject Headings:* **1. Historic auroras 2. China.**—*O.T.*

12A–213 **551.594.5**

Schubert, Günther (*Schwerin*), **Polarlichterscheinungen im Herbst 1951.** [Auroras in the fall of 1951.] *Die Sterne*, Leipzig, 28(7/8):148–150, **1952.** 5 drawings. **DLC**—Auroral displays of Sept. 25 and Oct. 7 and 28, 1951 are described on the basis of visual observations in or near Schwerin (Meckl.), Germany. Drawings of some characteristic forms observed are presented. (*Same item as* 6.1–351, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Schwerin, Germany.**—*G.T.*

12A–214 **551.521.326 551.594.5**

Seaton, S. L., **Night sky brightness at College, Alaska.** *Journal of Geophysical Research*, 55(1):43–46, March **1950.** 2 figs., 3 refs. **DWB**—Measurements made during Feb. 1949 by means of a low brightness photometer, on the very few nights when auroral activity was absent, gave values as low as 70 mμL (near the zenith) and 180 mμL (at the horizon). During auroras the values range up to 40,000 mμL. Curves show decrease of zenith sky brightness after sunset on April 7 and 9, 1949, respectively. (*Same item as* 7–58, and 8B–49, *Met. Abstracts.*) *Subject Headings:* **1. Night airglow 2. Auroras 3. College, Alaska.**—*M.R.*

12A–215 **551.594.5:551.501.8**

Seed, T. J. and Ellyett, C. D. (*both, Canterbury Univ. College, Christchurch, New Zealand*), **Low latitude reflections from the aurora australis.** *Australian Journal of Physics*, Melbourne, 11(1):126–129, March **1958.** 2 figs., table, 5 refs. **DLC**—A search for auroral reflections with a radar (or pulse radio transmitter) was begun in March 1957 at the Canterbury Univ. College Radio Observatory, 14 mi from Christchurch, N. Zealand (lat. 43.6°S, long. 172.6°E and 47.8°S geomagnetic lat.). Echoes were obtained at Christchurch on March 10, 1957 for 3 hrs (13–16 h) at 325–500 km range and 116–165 km height. The aurora was observed visually over S. New Zealand, Campbell Island and Australia earlier, and over all of New Zealand from 13–14 h, and in Australia 16–1630 h. Another radar display was observed on April 10. It is correlated with visual and magnetic data on a graph and was calculated to come to within a distance of 250 km and 93 km height. The beginning of the radar return coincided with a steep gradient on the magnetogram. A total of 10 auroras were thus observed in 61 days (April 10–June 10) and the data are tabulated. (*Same item as* 10.2–341, *Met. Abstracts.*) *Subject Headings:* **1. Radar observation of auroras 2. Aurora australis 3. Christchurch, New Zealand 4. Australia.**—*M.R.*

12A–216 551.594.5:551.501.8

Seed, T. J. (*Univ. of Canterbury, New Zealand*), **V.H.F. observations on the aurora australis.** *Journal of Geophysical Research*, Wash., D. C., 63(3):517–526, Sept. **1958.** 3 figs., 20 refs. **DLC**—Investigation of the aurora australis at a radio frequency of 69 Mc/s is reported. A value for the range exponent in the radar equation has been determined and values of the reflection coefficient deduced. Mechanisms of auroral reflection of radio waves are discussed, and only those involving column models are found to be substantiated. Noise emission from auroral ionization has been observed and measured at 69 Mc/s. (*Same item as* 10.5–342, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observation techniques 2. Radar observation of auroras.**—*Author's abstract.*

12A–217 551.594.5(09)

Seydl, Otto, **Polární záře ve zprávách starých kronikářů.** [Auroras in the records of old chroniclers.] *Meteorologické Zprávy*, Prague, 8(3):66–71, June **1955.** 2 figs. Russian and English summaries p. 66. **DWB**—Eighty descriptions of auroras observed in Bohemia from 1013 to 1805 are quoted from old Czech chronicles. Dates of the observations are included. The author discusses the vocabulary used in describing details of the appearance and movement of auroras. The phenomenon, extremely rare in Bohemia, was usually associated with the idea of fire and blood and was therefore considered to be a foreboding of war and other disaster. (*Same item as* 7.8–270, *Met. Abstracts.*) *Subject Headings:* **1. Historic auroras 2. Bohemia.**—*G.T.*

12A–218 551.594.5:551.510.535(99)

Shapley, A. H., **Clues to ionospheric conditions in the southern auroral zone.** *American Geophysical Union, Geophysical Monograph*, No. 1:86–90, **1956.** 4 figs., ref. **DLC**—While there is a considerable amount of experience with short-wave radio communication via the ionosphere from the many Antarctic expeditions beginning in 1911–12, quantitative determinations of ionospheric parameters exist for only a few places and for relatively short periods of time. From sweep-frequency vertical sounding observations at these few points on the Antarctic Continent and on surrounding islands, there is evidence of at least a rough north-south correspondence of F-region critical frequencies. The operation of a rather dense network of stations during IGY will be needed for any real description or understanding of these phenomena. The objectives of a number of analyses with data from the IGY period are mentioned. (*Same item as* 8.4–336, *Met. Abstracts.*) *Subject Headings:* **1. Auroral-ionospheric relationships 2. Antarctica.**—*Author's abstract.*

12A–219 551.510.535:551.506.22(98)

Shapley, Allan H., **The ionosphere IGY programme in the Arctic.** *International Geophysical Year*, 1957/1958, *Comité Special, Bulletin d'Information*, No. 7:60–62, **1956.** **DWB**—Ionosphere program is closely linked with the auroral and geomagnetic and even the cosmic ray programs. Behavior of the ionosphere in auroral regions and features at or near the North Pole during polar day and polar night will be investigated. Hemispheric symmetry will be studied by comparing Arctic and Antarctic data. Vertical soundings, studies of absorption, drifts, atmospheric noise (8 stations in Arctic) and sferics (1 station in Spitsbergen), whistlers and other phases of Arctic ionosphere program are discussed. (*Same item as* 10.3–38, *Met. Abstracts.*) *Subject Headings:* **1. Arctic ionosphere stations 2. IGY Arctic ionosphere program 3. Arctic.**—*N.N.*

12A–220 551.594.51:535.33

Shepherd, G. G., **Absolute calibration of a low brightness source.** Saskatchewan. Univ. Physics Dept., Contract AF 19(122)-152, Scientific Report, No. AR-16, **(1955?).** 13 p. 2 figs., table, 5 eqs. **DWB**—A description is given of a low brightness source for use as a secondary standard for a scanning spectrometer. The procedure used for its absolute calibration against black body source is discussed. This will enable absolute values to be given to the intensity of auroral features and the sodium D lines in the twilight flash. (*Same item as* 8.11–274, *Met. Abstracts.*) *Subject Headings:* **1. Spectrometer calibration 2. Auroral intensity measurement.**—*Author's abstract.*

12A-221 551.594.51:551.524.7

Shepherd, G. G. and Hunten, D. M., **On the measurement of rotational temperature from unresolved auroral nitrogen bands.** *Journal of Atmospheric and Terrestrial Physics*, 6(6):328-335, June **1955.** 5 figs., 2 tables, 10 refs. **DWB**—Measurements of 180 auroral spectra on the 3914 Å band are described, including correction to give line intensities, neglect of which makes the temperature estimates too low. Temperatures varied from 150–465°K, mean 258°K. Classification by auroral type indicates an increase with height. Heights were obtained by double photograph on 15 occasions; height distribution of temperatures is irregular but not inconsistent with rocket temperatures. (*Same item as* 6.10–291, *Met. Abstracts.*) *Subject Heading:* **1. Auroral temperatures.** —*C.E.P.B.*

12A-222 523.77:551.510.53:551.521.326:551.594.5

Shklovskiĭ, I. S. (*Inst. for Atmos. Physics, Acad. of Sci. of the USSR, Moscow*), **Elementary processes in the upper atmosphere and their manifestation in emissions.** *Annales de Géophyique*, Paris, 14(4):414–424, Oct./Dec. **1958.** 17 refs., 5 eqs. **DLC**—This article is subdivided into three chapters. a) New type of fluorescence in the upper layers of the terrestrial atmosphere; b) Some remarks on the excitation of H2 emission in auroras; c) Interplanetary gas and some geophysical problems. On the great variety of elementary processes in the upper atmosphere, leading to the emission of various lines and bands observed in the spectra of the night airglow and auroras, only the principal ones are discussed. Among their number is a new type of fluorescence in the upper atmosphere and also the problem of interaction of solar corpuscules with the atoms and molecules of the terrestrial atmosphere. (*Same item as* 10.8–187, *Met. Abstracts.*) *Subject Headings:* **1. Upper atmosphere 2. Fluorescence in the upper atmosphere 3. Auroral spectra 4. Night airglow spectra.** —*A.V.*

12A-223 551.594.5

Show model aurora. *Science News Letter*, Wash., D. C., 67(20):308, May 14, **1955. DLC**—Describes an experimental arrangement developed by WILLARD H. BENNETT of the Naval Research Laboratory in Washington. A small model earth is bombarded by electrons inside a vacuum tube. The existence of a ring current as first postulated by CHAPMAN, FERRARO and MARTYN is demonstrated in this experiment. It also shows simultaneous appearance of auroras in both hemispheres. (*Same item as* 7.8–271, *Met. Abstracts.*) *Subject Headings:* **1. Auroral models 2. Chapman-Ferraro theory 3. Ring currents.**—*G.T.*

12A-224 550.385

Slaucitajs, Leonidas, **Über die zeitlichen Störungen der magnetischen Deklination im Gebiete Nordeurasiens und Grönlands.** [Temporal disturbances in magnetic declinations in North Eurasia and Greenland.] *Geofisica Pura e Applicata*, Milan, 28:37–46, **1954.** 7 figs., 2 tables, 6 refs. **DWB**—The 11-year, annual and daily regime of magnetic declination disturbances are investigated on the basis of data obtained at Arctic (auroral zone) stations. East-West asymmetry is notable. Some stations have strong local influences. Tromsö (1930–1951) data show (1) good correlation between solar activity (relative sunspot number) and number of hours when mean declination was >1° from normal, (2) greatest seasonal deviations in March—least in Dec. with a ratio of 6:1 and (3) maximum hourly value between 1 and 2 a.m. local time—minimum about 16 h. Polar year (1932–33) data for 6 stations (Greenland and North Atlantic Arctic) show geographical distribution of anomalies of horizontal intensity. Thule shows maximum in May and minimum in Nov. Diurnal maximum and minimum vary from point to point. (*Same item as* 7.7–17, *Met. Abstracts.*) *Subject Headings:* **1. Magnetic disturbances 2. Auroral zones 3. Tromsö, Norway.**—*M.R.*

12A-225 662.2:539.1:551.594.5:778.3

Steiger, W. R. (*Univ. Hawaii*) and Matsushita, S. (*High Alt. Obs., Univ. Colo.*), **Photographs of the high-altitude nuclear explosion "Teak."** *Journal of Geophysical Research*, Wash., D. C., 65(2): 545–550, Feb. **1960.** 7 figs., 4 refs. **DLC**—A sequence of four photographs of the Aug. 1, 1958, high-altitude nuclear explosion 'Teak' near Johnston Island in the Pacific is shown. These photographs were taken from Maui, Hawaii, at an altitude of 3050 m and 1300 km from the explosion. Three main features of these photographs are evident and are discussed: an auroral arc directed southward; an expanding envelope; and an airglow cloud. The auroral arc extending southward from the explosion is interpreted as the glow produced by a stream of β-decay electrons directed along the earth's magnetic field. This arc apparently extended into the Southern Hemisphere and was observed from Apia, Samoa. The expanding envelope is interpreted as an excitation-recombination phenomenon produced by an expanding shock front. By assuming an average speed of propagation of 1.3 km/sec of the shock front, the times at which the photographs were taken are estimated. The airglow cloud is interpreted as a residue of ionized material having a lifetime estimated at 15 to 30 min. Assuming an electron density of 10 times the normal F_2 region value, an effective recombination coefficient of 10 times the normal F_2 value is obtained. The airglow cloud ascended at a rate of approximately 1000 m/sec and expanded horizontally at a rate of approximately 300 m/sec. *Subject Headings:* **1. Auroral arcs 2. Atomic explosion effects on the ionosphere 3. Photographic observation techniques 4. Johnston Island.**—*Authors' abstract.* Ⓢ

12A–226 551.510.62:551.594.51

Stein, Sidney (*Radio Propagation Lab., Stanford, Univ., Stanford, Calif.*), **The role of F-layer tilts in detection of auroral ionization.** *Journal of Geophysical Research*, Wash., D. C., 63(2):391–404, June **1958.** 6 figs., 15 refs. **DLC**—An important ionospheric mode for detection of powerful long-range auroral reflections at Stanford depends upon appropriate tilts in the F layer to the north. Auroral reflections received via this mode have been reported as originating from prevalent strongly reflecting ionized structures at great heights, between 300 km and 1200 km above the surface of the earth. This interpretation is rejected as a plausible explanation of the radio data. An explicit distinction is made between these auroral reflections and newer classes of radio reflections observed at high and middle latitudes arising from field-aligned ionization in the E and F regions. (*Same item as* 10.5–216, *Met. Abstracts.*) *Subject Headings:* **1. Auroral ionization detection 2. F layer tilts 3. Ionospheric radio wave reflection.**—*Author's abstract.*

12A–227 551.510.535

Stimson, Thomas E., Jr., **The sky unfolds its mysteries.** *Popular Mechanics Magazine*, Chicago, 99(3):97–102, 256, 258, March **1953.** photos., illus. (some in color). **DWB**—A vivid sketch of conditions prevailing in the upper atmosphere is drawn for the general public with a novel pseudo-spherical model of the atmosphere presented in color. Composition of the air, pressure, temperature and winds prevailing up to several hundred miles, jet streams, auroras, the light of the night sky are discussed and some of the current upper air research is mentioned. (*Same item as* 6D–215, *Met. Abstracts.*) *Subject Headings:* **1. Upper atmosphere models 2. Upper atmosphere research.**—*G.T.*

12A–228 551.594.5:551,506.21

*Störmer, Carl, **Results of the observations and photographic measurements of aurora in southern Norway and from ships in the Atlantic during the Polar Year, 1932–1933.** *Geofysiske Publikasjoner*, Oslo, 18(7), **1953.** 117 p. 7 figs., numerous tables, photos. **DLC**—Contains a list of stations with geographic coordinates, maps of station locations, list of dates on which auroras were photographed, list of additional nights on which visual observations only were made, a chronology of auroras observed in southern Norway, detailed descriptions of selected auroras and list of nights when no auroras were seen. Extensive tabular data include frequency of heights of all measured auroral points, frequency of heights of the lowest and highest points of the different auroral forms and height and situation of measured auroral points. The observations from eight ships are presented in a table and as a chronology. (*Same item as* 6.1–352, *Met. Abstracts.*) *Subject Headings:* **1. Auroral data 2. Auroral heights 3. Polar Year data, 1932–1933 4. Southern Norway 5. Atlantic Ocean.** —*M.L.R.*

12A–229 551.594.5(02)

*†Störmer, Carl, **The polar aurora.** Oxford, Clarendon Press, **1955.** 403 p. 213 figs. (incl. photos), numerous refs. throughout, tables, additional refs. p. 400–403. (*International Monographs on Radio*, ed. by Sir Edward Appleton and R. L. Smith-Rose.) **DLC** (QC971.S77). Review in *Royal Met. Soc., Quarterly Journal*, 82(351):115, Jan. **1956. DLC**—This is the first substantial textbook on the aurora to be published in the English language by the man who has become world famous for his life's work of photographing the aurora and studying its nature. The book could well have consisted entirely of the author's own findings which resulted mainly from over 50 years of study of parallactic photographs which he himself made by a method which he devised and many others have adopted. However, there is an abundance of reference to work of others in this field, as can be seen in the numerous foot references and the added references to recent literature not cited in the text. The book is divided into two major parts which deal with: I. the descriptive aspects and II. the purely physical (atomic or molecular) and theoretical aspects. The 32 chapters cover, among other subjects: (1) forms, (2) geographical description and periodicity, (3) methods of observation and photography, (4) height determinations by visual and (5) by photographic methods, (6) measurements near the auroral belt and (7) outside the auroral belt, (8) measurements and observations in S. Norway 1911–52, (9) sunlit auroras, (10) intensity, (11) color, (12) auroral spectra, (13) spectra of sunlit aurora, (14) radio waves (10 cm) from aurora, (15) corpuscular currents outside atmosphere, (16) radio echoes from aurora, (17) Doppler studies of corpuscular stream, (18) absorption of corpuscular rays by atmosphere, (19) emission of corpuscular rays from sun. Pt. II, (1) differential equations, (2) results from study of differential equations, (3) families of orbits, (4) numerical integration, (5) intuitive method of control, (6) results of numerical integration (Alfvén's method), (7) application of theory to laboratory experiments, (8) application of theory to polar

aurora, (9) limitations of theory, (10) approach of theory to actual conditions, (11) other theories (Chapman-Ferraro, Martyn and Alfvén), (12) other applications of research on motion of corpuscles in field of magnetic dipole: cosmic ray applications, allowed and forbidden regions, solar, magnetic and coronal relations, etc. A good author and subject index and scores of excellent original photographs are included. This is a most satisfying book—one that has been awaited 25 years. (*Same item as* 7.4–6, 11A–19, and 11B–135, *Met. Abstracts.*) *Subject Headings:* **1. Auroral textbooks 2. Auroral theories 3. Auroral photographs 4. Auroral bibliographies.**—*M.R.*

12A–230 551.594.52

Störmer, Carl, **Auroral activity during April–December 1956.** *Nature*, London, 179(4560):623, March 23, **1957. DWB**—Increasing auroral activity during 1956, followed increasing sunspot numbers. Displays of April 21–22, Oct. 26–27, Nov. 14–15 and Nov. 22–23 are described and heights given. (*Same item as* 8.7–337, *Met. Abstracts.*) *Subject Headings:* **1. Auroral descriptions 2. Auroral heights.**—*C.E.P.B.*

12A–231 551.506.22:551.594.5:778.3

Stoffregen, Willy (*Uppsala Jonosfärobservatorium, Sec. of Res. Inst. of National Defence, Stockholm*), **All-sky camera auroral research during the third Geophysical Year 1957–58.** *Tellus*, Stockholm, 7(4):509–517, Nov. **1955.** 9 figs. (incl. photos), 2 refs. **DWB, DLC**—A newly developed all sky or wide angle lens camera for photography of aurora is to be used at 5 stations in northern Scandinavia (Tromsö, Abisko, Malmberget, Alvsbyn and Lycksele) during the IGY. The photographs taken on 16 mm film at the rate of 1 exposure of 7 sec per min, for 12 hrs a day (average) during Sept.–April, will use 5000 m of film a year (for 6 stations). These observations will be supplemented by visual observations, especially in southern Sweden, and ionospheric records made at Tromsö, Oslo, Kiruna, Lulea, Lycksele and Uppsala. The camera, records, sample photographs, field installations and plans for coordination are described and illustrated. (*Same item as* 8.8–38, *Met. Abstracts.*) *Subject Headings:* **1. Auroral photography 2. Auroral photography networks 3. IGY networks 4. All-sky auroral cameras 5. Scandinavia.**—*M.R.*

12A–232 621.396:551.594.5

Stoffregen, W. (*Uppsala Ionos. Obs., Res. Inst. of Natl. Defence*), **Radio reflections on low frequencies from 75–90 km height during intense aurora activity.** *Journal of Atmospheric and Terrestrial Physics*, London, 13(1/2):167–169, Dec. **1958.** 2 figs., 4 refs. **DLC**—Observations with a new type of ionosphere recorder constructed at the Uppsala Ionospheric Observatory and installed at Uppsala and at the new ionospheric station at Lycksele (64°37′N and 18°45′E) are presented. The occurrence of low frequency reflections ND from about 80 km level during strong auroral activity is illustrated on a diagram. Photos of ionosphere records show aurora E-reflections as well as reflections from about 80 km level on frequencies down to 0.33 Mc/s. *Subject Heading:* **1. Radio reflections from auroras.**—*O.T.*

12A–233 551.510.535:551.594.12:551.594.51

Stoffregen, W.; Derblom, H. (*both, Uppsala Ionospheric Obs., Sweden*) and Omholt, A. (*Univ. Oslo*), **Some characteristics of the D-region ionization during auroral activity.** *Journal of Geophysical Research*, Wash., D. C., 65(6):1699–1704, June **1960.** 6 figs., 2 tables, 19 refs. **DLC**—D layer ionization during auroras was studied in the north of Sweden during the IGY. It was found that this type of D layer is closely associated with sudden auroral increase (SAI). The lowest measured heights of this D layer are ~65 km. The latitude variations of this D layer are discussed. It seems likely that both primary electrons and secondary X-rays may contribute to the formation of the auroral D ionization down to 65 km. *Subject Headings:* **1. D region 2. Auroral-ionospheric relationships 3. Ionization phenomena.**—*Authors' abstract.* Ⓢ

12A–234 551.594.5

Sucksdorff, G. Eyvind, **Das Polarlicht.** [Aurora.] *Naturwissenschaftliche Rundschau*, 8(1):7–15, Jan. **1955.** 12 figs. **DWB**—A useful summary is given of existing knowledge of auroras. Charts show frequency distribution around N and S magnetic poles, and heights in dark and sunlit parts of the atmosphere. Rays extending to 1100 km have been photographed. Relations to earth's magnetic field and to solar activity are discussed. Aurora is attributed to particles from the sun travelling along magnetic lines of force. Various theories are summarized but all present difficulties. Forms of aurora are described and illustrated. (*Same item as* 6.6–342, *Met. Abstracts.*) *Subject Headings:* **1. Auroras 2. Auroral theories.**—*C.E.P.B.*

12A–235 551.594.5(02)

Thomsen, I. L., **Manual for visual observations of the aurora australis.** *Wellington, New Zealand. Carter Observatory, Astronomical Bulletin*, No. 29, June **1949.** 25 figs. (incl. forms).

DWB—A most complete instruction or reference manual for auroral observations in New Zealand. It includes chapters on historical and theoretical aspects of auroras, networks of voluntary observers, types of reporting, false indications of aurora, auroral forms, timing, method of reporting, bearings and altitudes, instruments (home made and professional), elements to measure, recording, star references, auroral drawings, ship reporting, photography and, finally, applications, etc. (*Same item as* 7.10–299, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Aurora australis 3. Aurora manuals.**—*M.R.*

12A–236 551.594.5(99)

Thomsen, I. L. (*Carter Obs., Wellington, N. Z.*), **The aurora australis.** (In: Simpson, Frank A. (ed.). **The Antarctic today.** Wellington, Reed, **1952.** p. 261–278. 6 photos.) **DWB**—A general discussion of the aurora in the Southern Hemisphere: places where observed, types of auroras with remarks on actual cases, a map of zone of greatest frequency (eccentric with displacement toward Indian Ocean at 120°E and away from South America) showing favorable location of Tasmania and New Zealand for auroral observation, remarks on present research and observation programs in New Zealand (Carter Observatory and 300 voluntary observers), Macquarie and Heard Islands (in the max. zone auroras are observed on 100% of the days when it is dark, the author states), and a summary of present auroral theory which gives strong indications that atomic particles from some sort of solar disturbance are involved. (*Same item as* 7.4–300, *Met. Abstracts.*) *Subject Headings:* **1. Aurora australis 2. Auroral frequencies 3. New Zealand 4. Antarctica.**—*M.R.*

12A–237 551.594.5:551.506(931,94)

*Thomsen, I. L.; McQuistan, G. W. and Frankpitt, B. L., **Observations of the aurora australis, 1930–1954.** Wellington, N. Z. Carter Observatory, Contract AF 64(500)-4, Scientific Report No. 5, **1957.** 290 p. numerous tables. Also: McQuistan, G. W. and Frankpitt, B. L., **Observations of the Aurora australis, 1955–1956.** *Ibid.*, Report No. 6, **1958.** 38 p. numerous tables. **DWB**—A voluminous report on details of auroral observations made in New Zealand, Australia and Southern Ocean by a network of >300 regular observers (total number in report to date is 729) reporting since 1939 to the Carter Observatory (prior to 1939 under the supervision of the Royal Astronomical Society of New Zealand). The collection and assembling of these observations have become the chief function of the Observatory. Systematic methods have been used since 1935, and a manual was issued in 1949 (*see* 12A–235). All observers are voluntary except those at 11 New Zealand Meteorological Stations. Photographic observations have been made since 1950, but only visual observations are included in this compilation. Each observation is assigned a reference number which is followed in Sec. I by date, time first and last seen, and maximum, main forms, lat. and long. of station, intensity; in Sec. II, color; and, when available, altitude and azimuth of east, central and west portions of display (in Sec. III). In Sec. IV is an extensive presentation of details of individual displays (p. 120–273) wherever a further analysis is possible. The present volumes supersede all previous publications by Carter Observatory on this subject, and the material has been checked and verified. The number and location of observers and the extent of the observations of each display is mentioned, and the chronological features of the given display tabulated, the colors listed, etc. Sec. V gives a series of notes on glows, rays, bands, arcs, diffuse surfaces, draperies, coronae, flaming aurorae and on the development of displays in general as deduced from specific cases cited. One display (March 28, 1946) was seen at Newcastle Waters, N. Territory, Australia, at 170°S lat. The same display was seen in the Northern Hemisphere. Report No. 6 repeats general outline of No. 5 (for 1955–56). (*Same item as* 9.M1–27, *Met. Abstracts.*) *Subject Headings:* **1. Aurora australsi catalogs 2. New Zealand 3. Australia.**—*M.R.*

12A–238 551.501.81:551.594.52

Unwin, R. S. and Gadsden, M. (*both, IGY Station, Dept. of Sci. & Ind. Res., Awarua Radio, Invercargill, New Zealand*), **Determination of auroral height by radar.** *Nature*, London, 180(4600): 1469–1470, Dec. 28, **1957.** 2 figs., 3 refs. **DWB, DLC**—Auroral radio echoes observed by radar operating at 55 Mc/s at Bluff in the South Island of New Zealand. A well-defined aerial lobe pattern is obtained by interference of the direct and sea-reflected rays up to an angle of elevation of about 10°. The polarization is horizontal resulting in deep minima between lobes. A range-time record of auroral echoes and a graph of observed heights of auroral echoing regions versus observed ranges are presented. The region producing the echoes occurs as an approximately horizontal sheet at an average height of 110 km. (*Same item as* 9H–101, *Met. Abstracts.*) *Subject Headings:* **1. Radar echoes from auroras 2. Auroral height determination by radar 3. Bluff, South Island, New Zealand.**—*I.L.D.*

12A–239 551.521.9:551.594.51:551.507.362.2

Van Allen, James A. (*State Univ. of Iowa*), **Study of the arrival of auroral radiations.** (In: Van Allen, James A. (*ed.*), **Scientific uses of earth satellites.** Ann Arbor, Univ. of Michigan Press,

1956. p. 188–193. 4 figs., 5 refs.) **DWB, DLC**—The soft radiation discovered by the Iowa group above 50 km at auroral latitudes in 1953 and further studied during 1954 and 1955 provides a novel foundation for plotting out the auroral zone by direct observation. A satellite in a nearly pole-to-pole orbit is a splendid vehicle for this purpose. If such orbits are not available in the near future, a good start on the problem can be made by means of balloon-launched, two-stage, solid-fuel rockets, fired along a meridian over a 10° span of latitudes including the auroral zone. (*Same item as* 9.3–87, *Met. Abstracts.*) *Subject Heading:* **1. Satellite auroral radiation observation.**—*Author's abstract.*

12A–240 551.594.51:551.507.362.1

Van Allen, James A. (*State Univ. of Iowa*), **Direct detection of auroral radiation with rocket equipment.** *National Academy of Sciences, Wash., D. C., Proceedings,* 43(1):57–62, Jan. **1957.** 3 figs., 5 refs. **DLC**—A soft radiation measured above 50 km with rocket-borne Geiger tubes (1953–1955) is interpreted as X-rays (confirmed by laboratory experiments). This radiation is associated with primary auroral radiations (similar latitude distribution) but is not itself primary in nature. It appears reasonable to assume the X-rays to be bremsstrahlung from primary electrons. (*Same item as* 9.8-287, *Met. Abstracts.*) *Subject Heading:* **1. Rocket measurement of auroral radiation.**—*G.T.*

12A–241 551.594.5

Van Sabben, D., **Het poollicht van 29 September 1957.** [The aurora of Sept. 29, 1957.] *Hemel en Dampkring,* 56(1,2):21, Jan./Feb. **1958.** **DLC**—Brief report of several observations of aurora in the Netherlands on Sept. 29, 1957. (*Same item as* 9.8–283, *Met. Abstracts.*) *Subject Headings:* **1. Auroral observations 2. Netherlands.**—*A.V.*

12A–242 551.594.5:550.385.43

Van Sabben, D., **Het poollicht van 4 September 1958.** [The polar aurora of Sept. 4, 1958.] *Hemel en Dampkring,* The Hague, 56(11):206–208, Nov. **1958.** 3 photos. **DWB, DLC**—The polar aurora of Sept. 4, 1958 was one of the most important observed since 1938 in the Netherlands. The day before, the magnetic station at Witteveen registered a sudden commencement of a perturbation in the earth's magnetic field. A weak magnetic storm followed and the polar aurora was visible for one hour. A strong magnetic storm developed in the evening on Sept. 4, and the polar aurora could be observed from 20h45 until 04h50. The course of the phenomenon is described in detail. (*Same item as* 10.8–361, *Met. Abstracts.*) *Subject Headings:* **1. Aurora of Sept. 4, 1958 2. Sudden commencements 3. Witteveen, Netherlands.**—*A.V.*

12A–243 551.594.51:551.521.4

Vassy, A. and Vassy, E. (*Lab. of Phys. of the Atmos., Paris*), **Activité aurorale aux latitudes moyennes.** [Auroral activity in the middle latitudes.] *Indian Journal of Meteorology and Geophysics,* Delhi, V. 5, Spec. No.:137–140, Dec. **1954.** fig., 10 refs. In French; English summary p. 137. **DWB**—Available observations by various workers concerning the variations in the intensities of the three principal lines 5577, 5893 and 6300 Å in the auroral and night sky spectra are first summarized. The existence at geomagnetic latitude 70° of a very sharp maximum in the frequency of days with auroral activity is emphasized. It is suggested that, instead of frequency (in %) of days, it would be preferable to adopt as a criterion the product of the intensity of auroral light by the time during which it occurs. The general conclusion reached is that, in the middle latitudes, the luminescence of the night sky probably has a component arising out of feeble auroral activity. It would be desirable to make a systematic study of this question in a region of little cloudiness with instrumental equipment capable of giving an instantaneous response to night sky luminescence. (*Same item as* 7.2–281, *Met. Abstracts.*) *Subject Headings:* **1. Auroral intensity variations 2. Night sky spectrum 3. Auroral latitudes.**—*Authors' abstract.*

12A–244 551.594.51:535.33:551.510.535

Vegard, L., **On auroral spectroscopy and properties of the ionosphere.** *I. U. G. G. Association of Terrestrial Magnetism and Electricity, Brussels, 1951, Transactions,* pub. **1954.** p. 235–242. 3 tables, 9 refs., eqs. **DWB**—The auroral and ionospheric investigations carried out at Tromsö and at Oslo are briefly reported. In the experimental work new and improved spectrographs were used. Results of observations from Tromsö with respect to spectra of aurora, twilight and the ionospheric temperature are reported and tabulated. Results from observations at Oslo, especially those obtained with the new spectrograph are briefly noted. *Subject Headings:* **1. Auroral spectroscopy 2. Auroral-ionospheric relationships 3. Norway.**—*I.S.*

12A–245 551.594.5:551.506.22

†Vestine, E. H., **The aurora australis and related phenomena.** *American Geopyhsical Union, Geophysical Monograph,* No. 1:91–106, **1956.** 14 figs., 2 tables, 55 refs. **DLC**—In this compre-

hensive review of the characteristics of the aurora australis, the author discusses the characteristics of auroral forms, the average daily frequency and average hourly frequency of occurrence of the aurora australis, the auroral spectrum and air flow, the relationships prevailing in solar and magnetic phenomena, electric current systems and auroras and the Antarctic aurora and airglow programs of the IGY during 1957–58. The article contains a table of auroral stations in the Southern Hemisphere over the period 1841–1940, photographs of auroras and numerous graphs and charts illustrating the subjects considered. (*Same item as* 8.11–21, *Met. Abstracts.*) *Subject Headings:* **1. Aurora australis 2. Auroral frequencies 3. Auroral-solar relationships 4. IGY auroral program.**—*I.L.D.*

12A–246 **551.593**(02)

†Visser, Simon Willem, **Optische verschijnselen aan de hemel.** [Optical phenomena in the sky.] *Netherlands. Meteorologisch Instituut, Verspreide Opstellen,* No. 3, **1957.** 135 p. 67 figs., refs. English summary p. 128–132. "2d rev. and enl. ed. of his work by same title, published by N. V. J. Noorduyn in 1943." **DWB**—A nicely illustrated monograph describing all of the forms of optical phenomena usually encountered in nature: 1) Theory (physics and geometry) of reflection, refraction, diffraction, interference and scattering of light (especially sunlight); 2) observing methods and equipment; 3) optical phenomena in gases (atmospheric); 4) in liquid water-drops, rainbows and coronas and 5) in solids (ice crystals or dust). In this section halos of all types and Bishop's ring are discussed. Other sections are: 6) the diffusion of light (blue of the sky, twilight phenomena, alpenglow, crepuscular rays, nacreous clouds and noctilucent clouds); 7) electrical phenomena (aurora, airglow and St. Elmo's fire); 8) optical phenomena and the weather and 9) instructions for observers. Several very old illustrations of some of these phenomena, as well as modern glossy photos and drawings and schematic diagrams, plus a subject index add to the value of this little book. (*Same item as* 9.5–10, *Met. Abstracts.*) *Subject Headings:* **1. Optical phenomena 2. Halo phenomena 3. Auroras.**—*M.R.*

12A–247 **551.594.5**:**551.521.326** **551.507.362**:**550.3**

Vorschau auf die 100. Versammlung der Gesellschaft Deutscher Naturforscher und Ärzte. [Preview of the 100th Congress of the Society of German Scientists and Physicians.] *Naturwissenschaftliche Rundschau,* Stuttgart, 11(8):287–291, Aug. **1958.** 2 eqs. **DWB, DLC**—Two summaries of papers of meteorological interest are given. These are **Polarlicht und Nachthimmelleuchten** [Aurora and light of the night sky] by H. SIEDENTOPF and **Raketen und Satelliten im Dienste der Geophysik** [Rockets and satellites in the service of geophysics] by E. STUHLINGER. Auroras and light of the night sky are correlated with solar activity; they reflect both the 11 year sunspot cycle and solar eruptions. Investigation of these phenomena enables us to determine the nature of solar terrestrial relationship and to study solar physics at night. The measurement of atmospheric density, temperature, ionization of the atmosphere, etc. by means of rockets and satellites involves the use of both military and specially designed vehicles. The former are much heavier and can carry a larger pay load. The first measurements with moon rockets will provide data on its mass, its electron atmosphere, magnetic field and television pictures of the dark side. *Subject Headings:* **1. Auroral-solar relationships 2. Night airglow 3. Rockets 4. Satellite uses 5. Science congresses.**—*I.L.D.*

12A–248 **551.501.81**:**551.594.5**

Watkins, C. D. (*Jodrell Bank, Univ. Manchester*), **The height and geometry of auroral radio echoes.** *Journal of Atmospheric and Terrestrial Physics,* N. Y., 19(1):1–9, Sept. **1960.** 7 figs., 19 refs. **DLC**—The geometry of auroral radio echoes detected at Jodrell Bank with low sensitivity equipments (wave length 4 m) is discussed. It has been found that echoes are only obtained from regions where the line of sight is within 1° of perpendicularity to the lines of force of the local magnetic field at a height of about 110 km, with a spread in height of the echo regions of not more than 5 km. This conclusion is in disagreement with the original interpretation of BULLOUGH and KAISER (1954) who proposed that the range-azimuth characteristics of the echoes arose from the alignment of the reflecting regions along geomagnetic latitudes. The new result agrees well with other observations carried out at Jodrell Bank on a wave length of 8 m and with observations of the aurora australis carried out in Antarctica and New Zealand on shorter wave lengths. It is suggested that small differences in the location of the echo-regions arise from changes in the height of the regions and distortions of the lines of force during magnetic disturbances. *Subject Headings:* **1. Radio echoes from auroras 2. Auroral-geomagnetic relationships 3. Jodrell Bank, Eng.**—*Author's abstract.* Ⓢ

12A–249 **551.594.5**(99)

Weill, G., **Aspects de l'aurore observée à la base Dumont-d'Urville en Terre Adélie.** [Aspects of the aurora observed at the Dumont-d'Urville base, in Adélie Land.] *Académie des Sciences, Paris, Comptes Rendus,* 246(20):2925–2927, May 19, **1958.** fig., ref. **DLC**—The statistical study of the visual observations of the aurora, made in Adélie Land, in the course of the year 1957, shows a property of the arcs passing close by the station. The auroral arcs looming near to the zenith of the station present a wide amplitude systematic rotation, in terms of the time. They remain approximately oriented towards the sun. It is noted on the other hand that these arcs are much more frequent in the second part of the night, principally at the beginning of the dawn twilight (63% after 16 hr U.T.). The existence of the rotation phenomenon had been reported by SIR DOUGLAS MAWSON according to the observations at Denison Cape, 1912–1913. (*Same item as* 10.4–314, *Met. Abstracts.*) *Subject Headings:* **1. Visual observation of auroras 2. Auroral rotation phenomenon 3. Dumont d'Urville, Adélie Land.**—*A.V.*

12A–250 551.501.81:551.594.5

Weiss, A. A. and Smith, J. W. (*both, Dept. Phys. U. of Adelaide*), **Radar record of an aurora at Adelaide.** *Journal of Atmospheric and Terrestrial Physics*, London, 12(2/3):217 218, **1958.** 2 refs. **DLC**—The aurora of Sept. 13, 1957 was visible throughout Australia and was observed from Adelaide. Facts gathered were similar to those observed by HARANG and LANDMARK in 1954. The auroral echoes were first heard from 1655 to 1927 LT and the aurora was first seen at the limiting slant range of 900 km. The echoes varied considerably during the course of the aurora. They first appeared with small amplitude at maximum range. The amplitude then increased until the range reached a minimum value and thereafter decreased again as the range increased. (*Same item as* 10.6 127, *Met. Abstracts.*) *Subject Headings:* **1. Radar echoes from auroras 2. Aurora of Sept. 13, 1957 3. Adelaide, Australia.**—*N.N.*

·12A–251 551.594.5:551.521.64

Winckler, J. R.; Peterson, L. et al., **Auroral X-rays, cosmic rays and related phenomena during the storm of Feb. 10–11, 1958.** *Journal of Geophysical Research*, Wash., D. C., 64(6):597–610, June **1959.** 9 figs., 5 tables, 12 refs. **DWB, DLC.** Also issued as: Minnesota Univ. School of Physics, Technical Report on 2.12 Cosmic Ray Intensity at High Altitude by the U. S. National Committee for the IGY, in cooperation with Office of Naval Research, Wash., D. C., National Science Foundation, Nov. **1958.** 34 p. illus., tables. (Original unchecked.) (ASTIA AD-208-422)—Balloon observations were made during the auroral storm of Feb. 10–11, 1958 at Minneapolis. Strong X-ray bursts in 2 groups were detected. The groups appeared coincident with 2 large magnetic bays, with strong radio noise absorption, and with the passage across the zenith of a very large array of auroral luminosity. From the X-ray intensity and measured energies an electron current of 0.6×10^6 electrons/cm^2/sec is present. These electrons ionizing the upper D layer account for the increased cosmic noise absorption. The X-rays themselves are 1000 times less intense and do not provide sufficient ionization. Visual auroral forms during this storm are reported to have lower borders at the 200- to 300-km level. There is a difficulty in bringing the electrons to the D layer without an accompanying visible aurora. A cosmic ray decrease accompanied the storm and was observed to be from 4 to 6% at sea level, 21% in the balloon altitude ionization, and 15% in total energy influx at 55° geomag. latitude. Compared to the great intensity of the magnetic and auroral phenomena in this storm, the cosmic ray modulation is not exceptionally large. (*Same item as* 11.7–146, *Met. Abstracts.*) *Subject Headings:* **1. Auroral radiation 2. Auroras 3. Cosmic rays 4. Minneapolis, Minn.**—*TAB abstract.* Ⓢ

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Wright, J. W. and Knecht, R. W., **Atlas of ionograms, compiled for the URSI/AGI Special Committee on World-wide Ionospheric Soundings.** Boulder, Colo., Central Radio Propagation Lab., National Bureau of Standards, June **1957.** 7 p. numerous charts. **DWB** (M10.535 W951at) —A sizeable compilation of ionograms illustrates the diurnal, seasonal and geographical variations in types of records obtained by vertical sounding techniques all over the world. In Pt. I, ionograms are presented for summer and winter days, at 00, 06, 12 and 18 h local time, for 2 geomagnetically quiet days. Material is arranged by geomagnetic latitude without regard to hemisphere. In Pt. II, ionograms illustrate specific phenomena: Es types, disturbances (auroras, cosmic rays, SID's, lunar stratification multiple echoes, solar flares, etc.) and, finally, effects associated with local times or season (such as sunrise, etc.). Observation and classification techniques are specified. (*Same item as* 9.1–34, *Met. Abstracts.*) *Subject Headings:* **1. Ionogram Atlases 2. Ionospheric records. I. International Scientific Radio Union III. I. U. G. G. Association of Geodesy.**—*M.R.*

PART III. TRANSLATIONS AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted.

A. TRANSLATIONS

Soviet Astronomy AJ, New York, Vol. 4, No. 1, July/Aug. 1960 (Transl. of original Russian journal, **Astronomicheskiĭ Zhurnal,** Moscow, Vol. 37, No. 1, Jan./Feb. 1960)

(For contents of Russian edition, see p. 183 below)

Sobolev, V. V.: **Brightness of a spherical nebula,** p. 1–6

Kaplan, S. A.; Klimishin, I. A. and Sivers, V. N.: **Scattering of light in medium with a moving boundary,** p. 7–12

Dibai, E. A.: **Origin of cometary nebulae,** p. 13–18

Severnyĭ, A. B.; Steshenko, N. P. and Khokhlova, V. L.: **Spectroscopy of solar flares with echelette gratings,** p. 19–30

Vitkevich, V. V.: **Solar supercorona from the observations of 1951–1958,** p. 31–39

Masevich, A. G. and Volkonskaia, T. G.: **Structure of the sun,** p. 40–48

Teplitskaia, R. B.: **Comparison of the curves of growth for the center and the limb of the solar disc,** p. 49–59

Mitropol'skaia, O. N.: **Relation between the delay time of geomagnetic disturbances and the relative sunspot number,** p. 60–63

Mikhailov, A. A.: **Solar eclipse of February 15, 1961,** p. 64–73

Sitnik, G. F.: **General principles for the realization of a model of a black body at a high temperature,** p. 74–82

Gutman, A. M. and Levinson, I. B.: **Nonhomogeneous vector coupling in atomic spectra,** p. 83–84

Kupo, I. D.: **Spectrophotometric study of χ Ophiuchi, Pt. 2, Some properties of the emission spectrum of χ Oph.,** p. 85–90

Artiukhina, N. M.: **Photographic proper motions and the mean parallax of RW Aurigae variables,** p. 91–96

Kurochkin, N. E.: **Luminosity-variation amplitudes and the applicability of a black-body model to the study of cepheids,** p. 97–105

Dokuchaev, V. P.: **Formation of an ionized meteor trail,** p. 106–109

Katasev, L. A.; Korpusov, V. N. and Orlianskiĭ, A. D.: **Radar-echo observations of meteors using two receivers of different sensitivity,** p. 110–113

Kashcheev, B. L. and Lebedinets, V. N.: **Structure of the quadrantid meteor stream,** p. 114–117

Moroz, V. I.: **Night-airglow infrared emission spectrum to 3.4μ,** p. 118–124

Dzhasybekova, E. K.; Kazachevskiĭ, V. M. and Kharitonov, A. V.: **Determination of the earth's albedo,** p. 125–128

Likhachev, A. I.: **Diurnal sunlit component of F2 layer ionization during the first half of the day,** p. 129–133

Abele, M. K.: **Long-focus cameras for determining coordinates of faint artificial earth satellites,** p. 134–139

Efimov, A. A. and Otriashenkov, Iu. M.: **Photoelectric method for recording circle readings of meridian instruments,** p. 140–144

Sopel'nikov, M. D. and Baulin, I. V.: **Spark chronoscope for the oscillographic reception of time signals,** p. 145–149

Ishchenko, M. A.; Platomov, Iu. P. and Sukhov, V. B.: **An oscillographic apparatus for the reception of time signals,** p. 150–153

Butkevich, A. V.: **Application of geodetic principles to practical astronomy,** p. 154–165

Ezhov, N. N.: **Choice of celestial body for compass error determinations in the case of dead reckoning errors,** p. 166–173

Kornilov, A. I.: **Effect of sunspot magnetic fields on the growth curve,** p. 174–176

Amenitskiĭ, N. A.; Noskova, R. I. and Salomonovich, A. E.: **Radioimage of the moon at 8 mm,** p. 177–178

Shuiskaia, F. K.: **Determination of the Balmer decrement in auroral spectra,** p. 178–179

Soviet Astronomy AJ, New York, Vol. 4, No. 3, Nov./Dec. 1960 (English transl. of **Astronomicheskiĭ Zhurnal,** Moscow, Vol. 37, No. 3, May/June 1960)

(For contents of Russian edition, see p. 185 below)

Shklovskiĭ, I. S.: **Nature of supernovae,** p. 355–364
Vorontsov-Vel'iaminov, B. A.: **Ring galaxies,** p. 365–371
Sobolev, V. V.: **Theory of stellar evolution,** p. 372–379
Mustel', E. R.: **Existence of a general corpuscular field due to the sun,** p. 380–385
Mustel', E. R.: **Corpuscular velocities in streams responsible for M-disturbances,** p. 386–391
Bobrov, M. S.: **Types of irregular geomagnetic disturbances and the mechanisms of interaction of a solar corpuscular stream with the outer atmosphere,** p. 392–404
Chistiakov, V. F.: **Circulatory nature of the eleven-year cycle of solar activity,** p. 405–414
Pronik, V. I.: **Maximum thermal radio emissions in the galaxy in the direction $l = 353°$, $b = 0°$,** p. 415–417
Rostovskaia, A. A.: **Types of blue galaxies,** p. 418–421
Zhevakin, S. A.: **Phase and amplitude variations in radiation traversing a nonadiabatic envelope of a pulsating star,** p. 422–433
Oganesian, R. S.: **Gravitational instability of a layer relative to two-dimensional transverse disturbances,** p. 434–439
Dimov, N. A.: **An integrating stellar spectrophotometer,** p. 440–444
Kotliar, L. M.: **New design of a differential photometer for a solar magnetograph,** p. 445-450
Starikova, G. A.: **Luminosity and color functions of stars,** p. 451–464
Kotok, E. V.: **Interpretation of the spectrum-luminosity diagram for the Pleiades,** p. 465–467
Fesenkov, V. G.: **Photometric peculiarities of the moon,** p. 468–472
Barabashov, N. P. and Garazha, V. I.: **Some remarks on the dust and haze formations on Mars,** p. 473–479
Marochnik, L. S.: **Form of cometary envelopes,** p. 480–484
Mirtov, B. A.: **Mechanism of formation of a meteor trail,** p. 485–488
Furman, A. M.: **Theory of ionization in meteor trails, Pt. 1, Kinetics of the variation of ionization parameters for meteoroids heated by motion in the earth's atmosphere,** p. 489–497
Fialko, E. I.: **Duration distribution of meteor radio echoes, Pt. 2, Reflections from unstable trails,** p. 498–501
Peregudov, F. I.: **Dependence of the duration of a meteor reflection record on the radar system parameters,** p. 502–507
Kaplan, S. A. and Kurt, V. G.: **Expansion of a sodium cloud in interplanetary space,** p. 508 -514
Pariĭskiĭ, N. N.: **Influence of earth tides on the secular retardation of the earth's rotation,** p. 515–522
Iakovlev, N. V.: **Application of mirror-lens objectives for photographing artificial earth satellites,** p. 523–527
Sukharev, L. N.: **Simultaneous determination of latitude and clock correction from observations of four stars at the same altitude,** p. 528–538
Pil'nik, G. P.: **Collimation errors in astronomical observations,** p. 539–548
Bryzzhev, L. D.; Leikin, A. Ia. and Sopel'nikov, M. D.: **Determination of frequency of a maser, and of irregularities in the earth's rotation,** p. 549–553
Brengauz, G. E.: **Contribution to the detection of the absorption radio line of interstellar CH molecules,** p. 554–556
Shcheglov, P. V.: **Experience in photographing nebulae using an electronic telescope,** p. 556–558
Esipov, V. F.: **Stellar photography using an electronic telescope,** p. 558–560
Kraznozhenov, E. P. and Porfir'ev, V. V.: **Absorption line profiles in spectra of novae,** p. 560–561
Shklovskiĭ, I. S.: **Note on the nature of the radio source Sagittarius A,** p. 562 -563

B. ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Astronomicheskiĭ Zhurnal, Moscow, Vol. 36, No. 1, Jan./Feb. 1959 (Transl. into English in **Soviet Astronomy AJ,** New York, Vol. 3, No. 1, Jan./Feb. 1959)

Mustel', E. R. and Mitropol'skaia, O. N.: **O spektre skorosteĭ korpuskul v korpuskuliarnykh potokakh iz Solntsa,** [The velocity spectrum of corpuscles in solar corpuscular streams], p. 5–16
Syrovatskiĭ, S. I.: **Raspredelenie reliativistskikh elektronov v Galaktike i spektr magnitotormoznogo radioizlucheniia,** [The distribution of relativistic electrons in the galaxy and the spectrum of synchrotron radio emission], p. 17–32

Kuz'min, A. D. and Udal'tsov, V. A.: **Issledovanie poliarizatsii radioizlucheniia Krabovidnoĭ tumannosti v 10-cm diapazone voln,** [An investigation of the polarization of the 10-cm radiation of the Crab nebula], p. 33–40

Agekian, T. A.: **Veroiatnost' zvezdnogo sblizheniia s zadannym izmeneniem absoliutnoĭ skorosti,** [The probability of a stellar approach with a given change of the absolute velocity], p. 41–53

Khokhlova, V. L.: **Spektrofotometricheskoe issledovanie liniĭ H i K Ca^+ v khromosfere i solnechnykh fakelakh,** [A spectrophotometric investigation of the H and K Ca^+ lines in the chromosphere and solar faculae], p. 54–64

Kolpakov, P. E.: **O generirovanii korpuskuliarnykh potokov magnitnym polem solnechnykh piaten,** [Generation of corpuscular streams by the magnetic fields of sunspots], p. 65–72

Rublev, S. V.: **O vozmozhnosti istecheniia materii iz zvezd-sverkhgigantov pozdnikh klassov,** [Possibility of outflow of matter from supergiant stars of late spectral classes], p. 73–84

Idlis, G. M.: **Simmetriia statsionarnykh osesimmetrichnykh zvezdnykh sistem otnositel'no ekvatorial'noĭ ploskosti,** [The symmetry of stationary axially symmetric stellar systems relative to the equatorial plane], p. 85–88

Biutner, E. K.: **Dissipatsiia gaza iz atmosfer planet, II, Polnaia skorost' dissipatsii gaza iz atmosfery planety: problema zemnogo geliia,** [Gas dissipation from planetary atmospheres, Pt. 2, The total velocity of gas dissipation from a planetary atmosphere: the problem of terrestrial helium], p. 89–99

Barkhatova, K. A.: **Atlas diagramm tsvet-svetimost' rasseiannykh zvezdnykh skopleniĭ,** [An atlas of color-luminosity diagrams for open star clusters], p. 100–105

Sharov, A. S.: **O kharaktere sviazi izbytkov tsveta zvezd i iarkosti Mlechnogo Puti,** [Nature of the relation between stellar color excesses and the brightness of the Milky Way], p. 106–113

Teĭfel', V. G.: **O normal'nykh pokazateliakh tsveta i zavisimosti tsvet—iarkost' uchastkov lunnoĭ poverkhnosti,** [Normal color indexes and the color-brightness relation for portions of the lunar surface], p. 114–120

Artiukhina, N. M. and Karimova, D. K.: **Meridiannye sobstvennye dvizheniia 161 zvezdy v oblasti poiasa Oriona,** [The particular meridian motions of 161 stars in the region of the belt of Orion], p. 121–128

Bobrov, M. S.: **Vyvod teoreticheskoĭ fazovoĭ funktsii iarkosti kolets Saturna i sravnenie ee s nabliudeniiami,** [Derivation of the theoretical phase function of the brightness of Saturn's rings and its comparison with observations], p. 129–133

Fialko, E. I.: **Novyĭ metod opredeleniia radianta meteornogo potoka s ispol'zovaniem slabonapravlennoĭ antenny,** [A new method for determining the radiant of a meteor stream, using an antenna of low directivity], p. 134–136

Anfimov, N. A.: **Nekotorye zakonomernosti dvizheniia meteornykh tel v atmosfere,** [Some regularities in the motion of meteoric bodies in the atmosphere], p. 137–140

Dudnik, B. S.; Kashcheev, B. L.; Lagutin, M. F. and Lysenko, I. A.: **Skorost' meteorov v potoke Geminid,** [The velocity of meteors of the Geminid shower], p. 141–145

Drozdov, S. V.: **Katalog skloneniĭ 197 zvezd Poltavskoĭ zenitnoĭ programmy, vyvedennykh iz nabliudeniĭ 1944–1947 gg. na zenit-teleskope,** [A catalog of the declinations of 197 stars of the Poltava zenith program, selected from observations made with the zenith telescope from 1944 to 1947], p. 146–152

Duboshin, G. N.: **Ob odnom chastnom sluchae zadachi o postupatel'no-vrashchatel'nom dvizheniĭ dvukh tel,** [One particular case of the problem of the translational-rotational motion of two bodies], p. 153–163

Vol. 37, No. 1, Jan./Feb. 1960 (Transl. into English in **Soviet Astronomy AJ**, New York, Vol. 4, No. 1, July/Aug. 1960)

(For contents of English edition, see p. 181 above)

Sobolev, V. V.: **O svechenii sfericheskoĭ tumannosti,** [Brightness of a spherical nebula], p. 3–8

Kaplan, S. A.; Klimishin, I. A. and Sivers, V. N.: **Teoriia rasseianiia sveta v srede s dvizhushcheĭsia granitseĭ,** [Scattering of light in medium with a moving boundary], p. 9–15

Dibaĭ, É. A.: **O proiskhozhdenii kometoobraznykh tumannosteĭ,** [Origin of cometary nebulae], p. 16–22

Severnyĭ, A. B.; Steshenko, N. P. and Khokhlova, V. L.: **Spektroskopiia solnechnykh vspyshek s ėshele,** [Spectroscopy of solar flares with echelette gratings], p. 23–31

Vitkevich, V. V.: **Sverkhkorona Solntsa po nabliudeniiam 1951–1958 gg,** [Solar supercorona from the observations of 1951–1958], p. 32–41

Masevich, A. G. and Volkonskaia, T. G.: **O stroenii Solntsa,** [Structure of the sun], p. 42–50

Teplitskaia, R. B.: **Sravnenie krivykh rosta v tsentre i na kraiu solnechnogo diska,** [Comparison of the curves of growth for the center and the limb of the solar disc], p. 51–62

Mitropol'skaia, O. N.: **Sviaz' vremeni zapazdyvaniia geomagnitnykh vozmushcheniĭ s otnositel'nym chislom solnechnykh piaten,** [Relation between the delay time of geomagnetic disturbances and the relative sunspot number], p. 63–66

Mikhaĭlov, A. A.: **Solnechnoe zatmenie 15 fevralia 1961 goda,** [Solar eclipse of February 15, 1961], p. 67–74

Sitnik, G. F.: **Obshchie printsipy osushchestvleniia modeli chernogo tela pri vysokoĭ temperature,** [General principles for the realization of a model of black body at a high temperature], p. 75–85

Gutman, A. M. and Levinson, I. B.: **Neodnorodnye vektornye sviazi v atomnykh spektrakh,** [Nonhomogeneous vector coupling in atomic spectra], p. 86–87

Kupo, I. D.: **Spektrofotometricheskoe issledovanie χ Zmeenostsa, II, Nekotorye osobennosti emissionnogo spektra χ Zmeenostsa,** [Spectrophotometric study of χ ophiuchi, Pt. 2, Some properties of the emission spectrum of χ oph.), p. 88–94

Artiukhina, N. M.: **Fotograficheskie sobstvennye dvizheniia i sredniĭ parallaks peremennykh zvezd tipa RW Voznichego,** [Photographic proper motions and the mean parallax of RW Aurigae variables], p. 95–100

Kurochkin, N. E.: **Amplitudy kolebaniia bleska i primenimost' modeli chernogo tela k izlucheniiu tsefeid,** [Luminosity-variation amplitudes and the applicability of a black-body model to the study of cepheids], p. 101–110

Dokuchaev, V. P.: **Formirovanie ionizirovannogo meteornogo sleda,** [Formation of an ionized meteor trail], p. 111–114

Katasev, L. A.; Korpusov, V. N. and Orlianskiĭ, A. D.: **Radiolokatsiia meteorov s dvumia priemnikami razlichnoĭ chuvstvitel'nosti,** [Radar echo observations of meteors using two receivers of different sensitivity], p. 115–118

Kashcheev, B. L. and Lebedinets, V. N.: **O strukture meteornogo potoka kvadrantid,** [Structure of the quadrantid meteor stream], p. 119–122

Moroz, V. I.: **Infrakrasnyĭ spektr nochnogo neba do 3.4 mk,** [Night airglow infrared emission spectrum to 3.4μ], p. 123–130

Dzhasybekova, Ė. K.; Kazachevskiĭ, V. M. and Kharitonov, A. V.: **Opredelenie al'bedo zemnogo shara,** [Determination of the earth's albedo], p. 131–134

Likhachev, A. I.: **Sutochnaia osveshchennaia sostavliaiushchaia ionizatsiia sloia F2 za pervuiu poluvinu dnia,** [Diurnal sunlit component of F2 layer ionization during the first half of the day], p. 135–139

Abele, M. K.: **O primenenii dlinnofokusnykh kamer dlia opredeleniia koordinat slabykh iskusstvennykh sputnikov zemli,** [Long-focus cameras for determining coordinates of faint artificial earth satellites], p. 140–145

Efimov, A. A. and Otriashenkov, Iu. M.: **Fotoelektricheskiĭ metod otscheta krugov meridiannykh istrumentov,** [Photoelectric method for recording circle readings of meridian instruments], p. 146–150

Sopel'nikov, M. D. and Baulin, I. V.: **Iskrovoĭ khronoskop dlia ostsillograficheskogo priema signalov vremenii,** [Spark chronoscope for the oscillographic reception of time signals], p. 151–155

Ishchenko, M. A.; Platonov, Iu. P. and Sukhov, V. B.: **Ostsillograficheskaia ustanovka dlia priema signalov tochnogo vremeni,** [An oscillographic apparatus for the reception of time signals], p. 156–160

Butkevich, A. V.: **O primenenii printsipov geodezii v prakticheskoĭ astronomii,** [Application of geodetic principles to practical astronomy], p. 161–172

Ezhov, N. N.: **Vybor svetila dlia opredeleniia popravki kompasa pri nalichii oshibok schisleniia puti korablia,** [Choice of celestial body for compass error determinations in the case of dead reckoning errors], p. 173–181

Kornilov, A. I.: **O vliianii magnitnykh poleĭ solnechnykh piaten na krivuiu rosta,** [Effect of sunspot magnetic fields on the growth curve], p. 182–184

Amenitskiĭ, N. A.; Noskova, R. I. and Salomonovich, A. E.: **Radioizobrazhenie Luny v 8-millimetrovom diapazone,** [Radioimage of the moon at 8 mm], p. 185–186

Shuĭskaia, F. K.: **Opredelenie bal'merovskogo dekrementa v spektre poliarnykh siianiĭ,** [Determination of the Balmer decrement in auroral spectra], p. 186–186

Vol. 37, No. 2, March/April, 1960 (Transl. into English in **Soviet Astronomy AJ,** New York, Vol. 4, No. 2, 1960)

Ambartsumian, V. A. and Saakian, G. S.: **O vyrozhdennom sverkhplotnom gaze elementarnykh chastits,** [Degenerate superdense gas of elementary particles], p. 193–209

Mustel', E. R.: **O polnoĭ energii, soderzhashcheĭsia v korpuskuliarnykh potokakh,** [The total energy of corpuscular streams], p. 210–221

Ol', A. I.: **O vozmozhnoĭ periodichnosti solnechnoĭ deiatel'nosti,** [Possible periodicity of solar activity], p. 222–226

Gnevyshev, M. N.: **Sviaz' mezhdu opticheskim i radio-izlucheniiami solnechnoĭ korony,** [The connection between optical and radio emission of the solar corona], p. 227–235

Mogilevskiĭ, E. I.; Nikol'skiĭ, G. M. and Nikol'skaia, K. I.: **O poliarizatsii emissionnykh liniĭ korony,** [Polarization of coronal emission lines], p. 236–245

Gordon, I. M.: **Vspyshki Sverkhnovykh i proiskhozhdenie kosmicheskikh lucheĭ.** [Outbursts of supernovae and the origin of cosmic rays], p. 246–255

Shklovskiĭ, I. S.: **O vozmozhnom vekovom izmenenii potoka i intensivnosti radioizlucheniia ot nekotorykh diskretnykh istochnikov,** [Possible secular variations of the flux and intensity of radio emission from discrete sources], p. 256–264

Moroz, V. I.: **Potok ot Krabovidnoĭ tumannosti v λ 2μ i nekotorye zakliucheniia o spektre i magnitnom pole,** [The radiation flux from the Crab nebula at λ 2μ and some conclusions on the spectrum and magnetic field], p. 265–274

Ikhsanov, R. N.: **Tumannosti IC 1318 a, b, c i mezhzvezdnoe pogloshchenie,** [The nebulae IC 1318 a, b, c and interstellar absorption], p. 275–280

Kaplan, S. A. and Klimishin, I. A.: **Nekotorye zamechaniia ob izluchenii sveta udarnymi volnami v kosmicheskikh usloviiakh,** [Some comments on radiation by shock waves in cosmic conditions], p. 281–293

Skripkin, V. A.: **Reliativistskie popravki v zadache o tochechnom vzrye v ideal'noĭ gravitiruiushcheĭ sploshnoĭ srede,** [Relativistic corrections in the problem on a point explosion in an ideal gravitating continuous medium], p. 284–296

Kuz'min, A. D. and Salomonovich, A. E.: **Radioizluchenie Venery v 8-mm diapazone voln,** [Radio emission of Venus on 8-mm], p. 297–300

Barabashov, N. P. and Koval', I. K.: **Nekotorye rezul'taty issledovaniia kontrastov na Marse,** [Some results of studies of contrasts on Mars], p. 301–305

Bobrov, M. S.: **Teoreticheskie fazovye krivye tenevogo effekta na kol'tsakh Saturna, I, Vyvod formul,** [Theoretical phase curves of the shadow effect on Saturn's rings, Pt. 1, The deduction of the formulas], p. 306–316

Agekian, T. A.: **Obshchie cherty evoliutsii vrashchaiushchikhsia sistem gravitiruiushchikh tel,** [Common features in the evolution of rotating systems of gravitating bodies], p. 317–326

Kirillova, T. S.: **Statisticheskiĭ analiz diagrammy tsvet—vidimaia zvezdnaia velichina rasseiannogo skopleniia IC 1805,** [A statistical analysis of the color—visual magnitude diagram of the open cluster IC 1805], p. 327–331

Barkhatova, K. A. and Driakhlushina, L. I.: **Rasseiannoe zvezdnoe skoplenie NGC 1513,** [The open cluster NGC 1513], p. 332–335

Panaiotov, L. A.: **O kompensatsii refraktsionnykh effektov pri pomoshchi vakuumnoĭ prizmy,** [The compensation of refraction effects by means of a vacuum], p. 336–341

Razmadze, N. A.: **Sverkhplotnaia planetarnaia tumannost',** [A superdense planetary nebula], p. 342–344

Shatsova, R. B.: **Dispersiia logarifmov tangentsial'nykh skorosteĭ zvezd nizhneĭ chasti diagrammy spektr—svetimost',** [The dispersion of the logarithms of tangential velocities of stars in the lower part of the spectrum—luminosity diagram], p. 344–347

Slonim, Iu. M.: **Moshchnye khromosfernye vspyshki 10 i 14 iiulia 1959 g.,** [Intense chromospheric flares of July 10 and 14, 1959], p. 347–349

Kliakotko, M. A.: **O prinadlezhnosti poleĭ skorosteĭ dvizheniĭ nevozvrashchaiushchikhsia solnechnykh piaten po shirote razlichnykh godov k odnoĭ sovokupnosti,** [Membership of velocity fields of nonrecurrent sunspots in latitude for different years to a certain totality], p. 350–352

Popova, M. D.: **Ob iskrivlenii puti nekotorykh meteorov pri ikh dvizhenii v zemnoĭ atmosfere,** [The curvature of the paths of some meteors during their motion through the earth's atmosphere], p. 352–353

Fialko, E. I.: **K voprosu o raspredelenii meteornykh tel po skorostiam,** [Distribution of meteoric bodies with velocity], p. 354–356

Vol. 37, No. 3, May/June 1960 (Transl. into English in **Soviet Astronomy AJ**, New York, Vol. 4, No. 3, 1960)

(For contents of English edition, see p. 182 above)

Shklovskiĭ, I. S.: **O prirode Sverkhnovykh zvezd,** [Nature of supernovae], p. 369–380

Vorontsov-Veliaminov, B. A.: **Kol'tsevye galaktiki,** [Ring galaxies], p. 381–386

Sobolev, V. V.: **K teorii razvitiia zvezd,** [Theory of stellar evolution], p. 387–395

Mustel', E. R.: **O nalichii obshchego polia korpuskul iz Solntsa,** [Existence of a general corpuscular field due to the sun], p. 396–402

Mustel', E. R.: **O skorostiakh korpuskul v potokakh, sozdaiushchikh M-vozmushcheniia,** [Corpuscular velocities in streams responsible for M-disturbances], p. 403–409

Bobrov, M. S.: **Tipy irreguliarnykh geomagnitnykh vozmushcheniĭ i mekhanizmy vozdeĭstviia solnechnogo korpuskuliarnogo potoka na vneshniuiu atmosfery,** [Types of irregular geomagnetic disturbances and mechanisms of interaction of a solar corpuscular stream with the outer atmosphere], p. 410–424

Chistiakov, V. F.: **K voprosu o tsirkuliatsionnoĭ prirode 11-letnikh tsiklov solnechnoĭ aktivnosti,** [Circulatory nature of the 11 year cycle of solar activity], p. 425–435

Pronik, V. I.: **O maksimume teplovogo radioizlucheniia Galaktiki v napravlenii $l=353°$, $b=0°$,** [The maximum thermal radio emissions in the galaxy in the direction $l=353°$, $b=0°$], p. 436–438

Rostovskaia, A. A.: **O tipakh "golubykh galaktik,"** [Types of blue galaxies], p. 439–442

Zhevakin, S. A.: **Ob izmenenii fazy i amplitudy kolebaniĭ potoka izlucheniia pri prokhozhdenii cherez neadiabatnuiu obolochku pul'siruiushcheĭ zvezdy,** [The phase and amplitude variations in radiation traversing a nonadiabatic envelope of a pulsating star], p. 443–457

Oganesian, R. S.: **Gravitatsionnaia neustoĭchisvost' sloia po otnosheniiu k dvumernym poperechnym vozmushcheniiam,** [Gravitational instability of a layer relative to two-dimensional transverse perturbations], p. 458–463

Dimov, N. A.: **Zvezdnyĭ integriruiushchiĭ elektrospektrofotometr,** [An integrating stellar spectrophotometer], p. 464–468

Kotliar, L. M.: **Novaia skhema differentsial'nogo fotometra dlia solnechnogo magnitografa,** [A new design of a differential photometer for a solar magnetograph], p. 469–475

Starikova, G. A.: **Funktsii svetimosti i tsveta zvezd,** [Luminosity and color functions of stars], p. 476–491

Kotok, É. V.: **K voprosu ob interpretatsii diagrammy spektr—svetimost' dlia Pleiad,** [Interpretation of the spectrum—luminosity diagram for the Pleiades], p. 492–495

Fesenkov, V. G.: **Fotometricheskie osobennosti Luny,** [Photometric peculiarities of the moon], p. 496–500

Barabashov, N. P. and Garazha, V. I.: **Nekotorye soobrazheniia o pylevykh i tumannykh obrazovaniiakh na Marse,** [Some remarks on the dust and haze formations on Mars], p. 501–507

Marochnik, L. S.: **K voprosu o forme obolochek komet,** [Form of cometary envelopes], p. 508–512

Mirtov, B. A.: **O mekhanizme obrazovaniia meteornogo sleda,** [Mechanism of formation of a meteor trail], p. 513–516

Furman, A. M.: **K teorii ionizatsii meteornykh sledov, I, Kinetika izmeneniia ionizatsionnykh parametrov meteornykh tel pri ikh razogreve vo vremia dvizheniia v atmosfere Zemli,** [Theory of ionization of meteor trails, Pt. 1, The kinetics of the variation of the ionization parameters for meteoroids heated by motion in the earth's atmosphere], p. 517–525

Fialko, E. I.: **Raspredelenie meteornykh radioekho po dlitel'nosti. II. Otrazheniia ot neustoĭchivykh sledov,** [The duration distribution of meteor radio echoes, Pt. 2, Reflections from unstable trails], p. 526–529

Peregudov, F. I.: **Zavisimost' vremeni registratsii meteornykh otrazheniĭ ot parametrov radiolokatsionnoĭ stantsii,** [The dependence of the duration of a meteor reflection record on the radar system parameters], p. 530–535

Kaplan, S. A. and Kurt, V. G.: **Razlet natrievogo oblaka v mezhplanetnom prostranstve,** [Expansion of a sodium cloud in interstellar space], p. 536–542

Pariĭskiĭ, N. N.: **O vliianii zemnykh prilivov na vekovoe zamedlenie vrashcheniia Zemli,** [The influence of earth tides on the secular retardation of the earth's rotation], p. 543–549

Iakovlev, N. V.: **K voprosu o primenenii zerkal'no-linzovykh ob"ektivov dlia fotografirovania iskusstvennykh sputnikov Zemli (ISZ),** [Application of mirror lens objectives for the photography of artificial earth satellites], p. 550–554

Sukharev, L. N.: **Sovmestnoe opredelenie shiroty mesta i popravki chasov iz nabliudeniĭ chetyrekh zvezd na ravnykh vysotakh,** [A simultaneous determination of latitude and clock correction from observations of four stars at the same altitude], p. 555–566

Pil'nik, G. P.: **Kollimatsionnye oshibki v astronomicheskikh nabliudeniiakh,** [Collimation errors in astronomical observations], p. 567–578

Bryzzhev, L. D.; Leĭkin, A. Ia. and Sopel'nikov, M. D.: **Opredelenie chastoty molekuliarnogo generatora i neravnomernosti vo vrashchenii Zemli,** [A determination of frequency of a maser and the irregularities in the earth's rotation], p. 579–583

Brengauz, G. E.: **K obnaruzheniiu absorbtsionnoĭ radiolinii mezhzvezdnykh molekul CH,** [Detection of the absorption radio line of interstellar CH molecules], p. 584–586

Shcheglov, P. V.: **Opyt fotografirovaniia tumannosteĭ na elektronnom teleskope,** [Photography of nebulae with an electronic telescope], p. 586–588

Esipov, V. F.: **O fotografirovanii zvezd elektronno-teleskopicheskim metodom,** [Photography of stars with an electronic telescope], p. 588–589

Krasnozhenov, E. P. and Porfir'ev, V. V.: **O konture linii pogloshcheniia v spektre Novykh,** [Absorption line profiles in the spectra of novae], p. 589–590

Shklovskiĭ, I. S.: **O prirode istochnika radioizlucheniia Strelets-A,** [Nature of the radio source Sagittarius-A], p. 591–592

Akademiia Nauk Kazakhskoĭ SSR. Astrofizicheskiĭ Institut, Izvestiia, Vol. 8, 1959

Fesenkov, V. G.: **Ob usloviiakh desintegratsii asteroidov po nabliudaemym osobennostiam Zodiakal'nogo sveta,** [Conditions of disintegration of asteroids according to observed properties of zodiacal light], p. 3–12

Fesenkov, V. G.: **O zodiakal'nykh sumerkakh,** [On zodiacal twilight], p. 13–18

Rozhkovskiĭ, D. A. and Gaĭnullina, R. Kh.: **Ob iskazhenii krivoĭ bleska, naĭdennoi po fotografiiam s dlitel'noĭ vyderzhkoĭ,** [Deformation of the brightness curve obtained by long-exposure photographs], p. 19–23

Idlis, G. M.: **Sviaz' obshchikh svoĭstv gravitatsionnogo potantsiiala zvezdnykh sistem s obshchim vidom integralov dvizheniia otdel'noĭ zvezdy,** [Relation between general properties of the gravity potential of stellar systems and the general form of integrals of the motion of an individual star], p. 24–52

Matiagin, V. S.: **Koeffitsienty prozrachnosti zemnoĭ atmosfery v ul'trafiolete, opredelennye po nekotorym zvezdam,** [Coefficients of transparency of the earth's atmosphere in the ultraviolet for some stars], p. 53–58

Karimov, M. G.: **Zheltaia koronal'naia liniia 5694A po vnezatmennym nabliudeniiam,** [The yellow coronal line 5694A according to observations without darkening], p. 59–63

Obashev, S. O.: **Ob elektromagnitnom mekhanizme progreva solnechnykh protuberantsev,** [Electromagnetic mechanism of heat production in solar prominences], p. 64–67

Kariagina, Z. V.: **Nizhoshirotnoe poliarnoe siianie 29–30 sentiabria 1957 goda,** [Low latitude aurora of Sept. 29–30, 1957], p. 68–78

Gaĭnullina, R. Kh.: **Spektrofotometriia krasnoĭ chasti spektra nizkoshirotnogo poliarnogo siianiia 29–30 sentiabria 1957 goda,** [Spectrophotometry of the red spectral region of the low latitude aurora of Sept. 29–30, 1957], p. 79–81

Piaskovskaia-Fesenkova, E. V.: **Nekotorye dannye o poliarizatsii neba v Iuzhnom Egipte,** [Data on sky polarization in southern Egypt], p. 82–97

Boĭko, P. N.; Livshits, G. Sh. and Toropova, T. P.: **Prozhektornye issledovaniia indikatris rasseianiia,** [Searchlight investigation of diffusion coefficients], p. 98–107

Boĭko, P. N.: **Spektroelektrofotometr s avtomaticheskoi zapis'iu spektra,** [Spectroelectrophotometer with automatic recording the spectrum], p. 108–114

Vol. 9, 1959

Fesenkov, V. G.: **Poliarizatsiia zodiakal'nogo sveta po nabliudeniiam v Egipte,** [Polarization of zodiacal light according to observations in Egypt], p. 3–9

Karimov, M. G. and Shilova, N. S.: **O vzaimosviazi dvizheniia materii korony i protuberantsev,** [Relationship between the motion of coronal matter and that of prominences], p. 10–20

Kurchakov, A. V.: **Fotometricheskoe izuchenia komety Arenda-Rolanda,** [Photometric observations of the Arend-Roland comet], p. 21–28

Kharitonov, A. V.: **Elektrofotometricheskie nabliudeniia peremennoĭ AEAur,** [Electrophotometric observations of the variable star AEAur], p. 29–31

Kharitonov, A. V.: **Poliarizatsionnye nabliudeniia zvezd,** [Polarization observations of stars], p. 32–34

Fesenkov, V. G.: **O metodike reduktsiĭ fotometricheskikh nabliudenii nad zodiakal'nym svetom,** [Method of reduction of photometric observations of zodiacal light], p. 35–39

Matiagin, V. S.: **Ob uchete fona pri fokal'noĭ fotograficheskoĭ fotometrii zvezda,** [Accounting for background in stellar photogrammetry], p. 40–52

Kharitonov, A. V.: **K voprosu ob opredelenii nochnogo koeffitsienta prozrachnosti,** [Determining the coefficient of transparence at night], p. 53–55

Rozhkovskiĭ, D. A.: **K dinamike vstrechi temnykh oblakov so zvezdami,** [Dynamics of the coincidence of dark nebulae with stars], p. 56–77

Idlis, G. M. and Gridneva, S. A.: **Novye metody opredeleniia mass kosmicheskikh sistem na osnova effektov teorii otnositel'nosti,** [New methods of determining the mass of cosmic systems on the basis of effects of the theory of relativity], p. 78–85

Kariagina, Z. V. and Tulenkova, L. N.: **Spektrofotometricheskoe issledovanie nepreryvnogo i emissionnogo spektra nochnogo neba v vizual’noĭ oblasti spektra,** [Spectrophotometric study of the continuum and emission spectra of nightglow in the visual region], p. 86–95

Divari, N. B.: **O tsvete sumerechnogo neba v zenite,** [Light of the twilight sky in the zenith], p. 96–107

Toropova, T. P.: **Nekotorye rezul’taty izmerenii indikatris rasseianiia i poliarizatsii sveta v prizemnom sloe atmosfery,** [Some results of measurements of coefficients of scattering and polarization of light in the atmospheric layer near the ground], p. 108–117

Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz., No. 11, Nov. 1960

Zharkov, V. N.: **Fizika iadra zemli: Mekhanicheskie svoĭstva i viazkost’, II,** [Physics of the earth's core: Mechanical properties and viscosity, Pt. 2], p. 1553–1562

Khorosheva, V. V.: **Nekotorye rezul’taty issledovaniia voln *Pa* i *Sa* po seĭsmogrammam stantsiĭ SSSR,** [Certain results of investigations of P_a and S_a waves from seismograms of Soviet stations], p. 1563–1569

Bulin, N. K. and Triufil'kina, E. I.: **Ispol’zovanie obmennykh voln *SP*, registriruemykh pri blizkikh zemletriaseniiakh, dlia izucheniia glubinnogo stroeniia zemnoĭ kory,** [Use of exchange *SP* waves recorded during nearby earthquakes in the study of the structure of the earth's crust at depth], p. 1570–1579

Konstantinova, A. G.: **Vremennoe raspredelenie energii uprugikh impul’sov pri razrushenii gornykh porod,** [Temporary distribution of elastic impulses during the destruction of rocks], p. 1580–1592

Belotelov, V. L.; Savarenskiĭ, E. F. and Feofilaktov, V. D.: **Opredelenie energii zemletriaseniia 15. XI 1959 g.,** [Determination of the energy of the earthquake of Nov. 15, 1959], p. 1593–1597

Vladimirov, N. P. and Kolmakov, M. V.: **O razreshaiushcheĭ sposobnosti magnito-telluricheskogo metoda,** [Resolving power of the magnetic-telluric method], p. 1598–1600

Rykunov, L. N.; Khorosheva, V. V. and Sedov, V. V.: **Dvukhmernaia model’ seĭsmicheskogo volnovoda s nerezkimi granitsami,** [Two-dimensional model of a seismic wave channel with weak boundaries], p. 1601–1603

Shakhsuvarov, D. N. and Rybakova, E. V.: **O primenimosti predstavleniĭ dal’neĭ zony pri chastotnykh elektromagnitnykh zondirovaniiakh,** [Applicability of the concept of a distant zone during electromagnetic frequency soundings], p. 1604–1607

Shaub, Iu. B.: **O napravlennom prieme vtorichnykh signalov v ĕlektrorazvedke metodom vrashchaiushchegosia magnitnogo polia,** [Oriented reception of repeated signals in electrical surveys using the rotating magnetic field method], p. 1608–1611

Tabulevich, V. N.: **Makhachkalinskoe zemletriasenie v marte 1960 g,** [Earthquake in the Makhachkala region in March 1960], p. 1612–1613

Kolesnikov, A. G.: **Vertikal’nyĭ turbulentnyĭ obmen v ustoĭchivo stratifitsirovannom more,** [Vertical turbulent exchange in a stably stratified sea], p. 1614–1623

Novikov, E. A.: **O magnitnoĭ gidrodinamike ionosfery,** [Magnetic hydrodynamics of the ionosphere], p. 1624–1634

Nemchinov, S. V.: **Issledovanie resheniia uravneniia dlia prognoza baricheskogo polia atmosfery,** [Investigation of the solution of the equation for forecasting the pressure field of the atmosphere], p. 1635–1641

Diubiuk, A. F.: **K zadache prognoza baricheskogo polia po polnoĭ sisteme uravneniĭ gidromekhaniki,** [Problem of forecating the pressure field from a full system of hydromechanical equations], p. 1642–1648

Pokhunkov, A. A.: **Issledovanie neĭtral’nogo verkhneĭ atmosfery na vysotakh svyshe 100 *km*,** [Investigation of the neutral composition of the upper atmosphere at heights greater than 100 km], p. 1649–1657

Balabanova, V. N.: **Kristallizatsiia pereokhlazhdennykh tumanov ĭodistym serebrom,** [Crystallization of supercooled fog by silver iodide], p. 1658–1662

Komarov, N. N. and Seredkin, A. A.: **Schetchik tiazhelykh ionov,** [Heavy ion counter], p. 1663–1670

Pletnev, V. D.: **Ob odnoĭ vozmozhnosti utechki zariazhennykh chastits iz vneshnego geomagnitnogo polia.** [Possibility of a leak of charged particles from a suspended geomagnetic field], p. 1671–1673

Tsvang, L. R.: **Izmereniia spektrov temperaturnykh pul’satsiĭ v svobodnoĭ atmosfere,** [Measurement of the spectrum of temperature fluctuations in the free atmosphere], p. 1674–1678

Makhon'ko, K. P.: **Izuchenie perenosa atmosfernoĭ pyli,** [Study of the transport of atmospheric dust], p. 1679–1683

Ovsiannikov, V. V.: **O gidrodinamicheskom metode prognoza vlazhnosti, oblachnosti i atmosfernykh osadkov,** [A hydrodynamic method of forecasting humidity, cloudiness and precipitation], p. 1684–1687

Astrophysical Journal, Chicago, Vol. 132, No. 2, Sept. 1960

Broten, N. W. and Medd, W. J.: **Absolute flux measurements of Cassiopeia A, Taurus A, and Cygnus A, at 3200 mc/s,** p. 279–285
Limber, D. Nelson and Mathews, William G.: **The dynamical stability of Stephan's Quintet,** p. 286–305
Liller, Martha Hazen: **The distribution of intensity in elliptical galaxies of the Virgo Cluster,** p. 306–324
Osterbrock, Donald E.: **Interstellar matter in elliptical galaxies, Pt. 2,** p. 325–340
Hodge, Paul W.: **Studies of the Large Magellanic Cloud, Pt. 2–4,** p. 341–353
Varsavsky, Carlos M.: **The gravitational contraction times of stars in very young clusters,** p. 354–360
Hardie, R. H.; Seyfert, C. K. and Gulledge, I. S.: **A study of the I Geminorum association,** p. 361–365
Demarque, Pierre: **The structure of population II stars,** p. 366–379
Weymann, Ray: **Coronal evaporation as a possible mechanism for mass loss in red giants,** p. 380–403
Kraft, Robert P.: **Color excesses for supergiants and classical cepheids, Pt. 2, The period-color relation for classical cepheids,** p. 404–416
Oke, J. B. and Bonsack, S. J.: **An analysis of the absolute energy distribution in the spectrum of RR Lyrae,** p. 417–429
Fitch, W. S.: **Rediscussion of Delta Scuti,** p. 430–434
Covington, Arthur E. and Harvey, Gladys A.: **The visibility of the 10-cm radioemissive region and its application in finding the 10-cm quiet sun,** p. 435–451
Weymann, Ray: **Heating of stellar chromospheres by shock waves,** p. 452–460
Aller, L. H. and Chapman, Sydney: **Diffusion in the sun,** p. 461–472
Goldstein, J. S.: **The infrared reflectivity of a planetary atmosphere,** p. 473–481
Halliday, Ian: **The spectrum of an Asteroidal meteor fragment,** p. 482–485
Davis, Sumner P.: **Hyperfine structure, Zeeman effects, and separation of lines in terbium spectra,** p. 486–492
Mizushima, M.: **Theory of the radio-frequency spectra of the H_2^+ molecule-ion,** p. 493–501
Urey, Harold C.: **The duration of intense bombardment processes on the moon,** p. 502–503
Burgess, Alan: **A note on the calculation of coronal ionization cross-sections,** p. 503–505
Heiser, Arnold M.: **Relative abundances in the high-velocity star HD 25329,** p. 506–507
Donn, Bertram: **On ion clusters in the interstellar gas,** p. 507–509
King, Jean, I. F.: **The Hopf *q*-function simply and precisely evaluated,** p. 509–511
van Albada, T. S. and Borgman, J.: **A standard light-source for photoelectric photometry based on Čerenkov radiation,** p. 511–512
Pesch, Peter; Hiltner, W. A. and Brandt, J. C.: **A new Wolf-Rayet spectroscopic binary,** p. 513–514
Burke, B. F.: **The radio-frequency spectrum of H_2^+,** p. 514–516
Honsaker, John L.: **Levels of N^{15} near 7-Mev excitation from $N^{14}(d,p')N^{15}$,** p. 516–517
Johnson, Harold L.: **A new color-magnitude diagram for the Hyades cluster,** p. 517–518

Időjárás, Budapest, Vol. 64, No. 1, Jan./Feb. 1960

Krustanov, L. and Iordanov, D.: **Über das Kriterium des thermischen Gleichgewichts in der Atmosphäre,** [Criterion of the thermal equilibrium in the atmosphere], p. 1–8
Čadež, M.: **Thermodynamic diagram for the relative humidity,** p. 8–12
Bodolai, István: **Opyt kolichestvennogo prognoza osadkov pri prokhozhdenii teplogo fronta,** [Attempt at quantitative forecasting of precipitation during passages of warm air fronts], p. 13–20
Takács, Lajos and Zách, Alfréd: **A borultság és a napsütes óraértékeinek kapcsolata,** [Relation of hourly values of cloudiness and sunshine], p. 21–27
Péczely, György: **A Kárpátok védőhatása északkeleti hidegbetörés esetén,** [Shielding effects of the Carpathian Mountains during northeasterly cold incursions], p. 28–34
Goll, György: **Talajok fényvisszaverőképességének függése a nedvességtartalomtól és a fény színétől,** [Dependence of the reflectivity of soil on moisture content and color of light], p. 35–38

Szepesi, Anna (Lőrincz): **A talajközeli légréteg páranyomásának vizsgálata a Balaton térségében,** [Investigations on the atmospheric vapor pressure near the ground in the area of Lake Balaton], p. 38–43

Kozma, Ferenc; Stollár, András and Szilágyi, Tibor: **Szellőztetett termisztoros pszichrométer,** [Aspiration psychrometer with a thermistor], p. 44–47

Pletser, János: **A száraz és nedves talaj hőmérséklete,** [Temperature of dry and wet soil], p. 48–49

Tänczer, Tibor: **A számszerű előrejelzések kiértékeléséről,** [Verification of numerical forecast], p. 49–52

Mészáros, Ernő: **Új elmélet a zivatarfelhők elektromos jelenségeinek magyarázatâra,** [New theory of electrical phenomena in thunderclouds], p. 52–53

Szepesi, Dezső: **A divergenciamentes szintről,** [The level of nondivergence], p. 54–55

Aujeszky, Lászlo: **[Obituary of] Jordan Károly,** p. 61–63

Vol. 64, No. 2, March/April, 1960

Dési, F.: **Gleichgewicht des Wassertröpfe enthaltenden Wolkenluftquantums,** [Equilibrium of the cloud-air-quantum containing water droplets], p. 65–71

Konček, M.: **Besonderheiten im Temperaturregime an den Südhägen der Hohen Tatra,** [Peculiarities in the temperature regime of the southern slopes of the high Tatra Mountains], p. 72–82

Mészáros, E. and Wirth, E.: **Distribution spectrale des gouttes des pluies tombant des nuages stratiformes,** [Distribution spectrum of raindrops falling from stratiform clouds], p. 82–87

Pápai, Gabriella (Szalay): **Az also 5 km-es légréteg hőmérsékleti szerkezete különböző makroszinoptikus helyzetekben,** [Temperature-structure of the lower 5 km air layer in different large scale synoptic situations], p. 88–95

Rákóczi, Magdolna (Wagner): **A csapadék eloszlása Magyarországon meridionális áramlású ciklonalis helyzetekben,** [Precipitation distribution in Hungary during cyclonic situations with meridional circulation], p. 96–102

Koppány, György: **Erősen fejlett anticiklonmagok elterjedése az Északifélgömbön,** [Occurrence of strongly developed anticyclone centers over the Northern Hemisphere], p. 103–105

Szepesi, Dezső: **A nullarétegről,** [Null layer], p. 106–108

Wirth, Endre: **A jégfázis létrejöttének kérdésére vonatkozó vizsgálatok,** [Research on the problem of ice phase formation], p. 109–111

Aujeszky, Lászlo: **Az éghajlat fogalmának általánosítása a bolygóközi térre,** [Generalization of the concept of climate to include interplanetary space], p. 112–113

Pletser, János: **Öntözött talaj hőmérséklete,** [Temperature of irrigated soil], p. 113–114

Urbán, Barna: **Időjárási följegyzések Sárospatakon 1847–53 között,** [Weather records at Sarospatak, 1847–1853], p. 115–118

Indian Journal of Meteorology and Geophysics, New Delhi, Vol. 11, No. 3, July 1960

Parthasarathy, K. et al.: **Rainfall and floods during 1959 southwest monsoon period,** p. 215–222

Howe, G. Melvyn: **Homoclimes within the British Commonwealth,** p. 223–238

Rai Sircar, N. C. and Lal, S. S.: **A preliminary study of 5-day mean flow patterns in relation to 5-day precipitation in north India during winter season,** p. 239–257

Sivaramakrishnan, M. V.: **The relation between raindrop size distribution, rate of rainfall and the electrical charge carried down by rain in the tropics,** p. 258–268

Lal, S. S. and Rai Sircar, N. C.: **A monsoon storm as studied on 5-day mean charts,** p. 269–275

Agarwala, K. S.: **Local variations of air temperature at Delhi,** p. 276–278

Ghose, S. K.: **An analysis of September 1958 rainstorm over Damodar Valley area,** p. 279–284

Mani, Anna; Huddar, B. B.; Kachare, N. R.; Swaminathan, M. S.; Srivastava, G. P. et al.: **Seasonal variation of potential gradient in the free atmosphere at Poona during the I.G.Y.,** p. 285–294

Venugopal, V. R.: **Temperature of the *F*2 region of the ionosphere over Kodaikanal,** p. 295–297

Iyer, H. M. and Kartha, T. D. K.: **Microseisms associated with the intense cycle in the Bay of Bengal during September 1959,** p. 298–300

Solar, geomagnetic, ionospheric and ozone data, p. 307–317

Mukherjee, Asoke Kumar: **Removal of soluble gaseous air pollutants by fog,** p. 318–319

Journal de Mécanique et de Physique de l'Atmosphère, Paris, Vol. 1, No. 3, July/Sept. 1959

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- McInnes, B. and Robertson, K. A.: **Latitude distribution and seasonal variation of aurora over the British Isles during 1957 and 1958,** p. 115–125
- Currie, D. R. and Kreielsheimer, K. S.: **A double field mill for the measurement of potential gradients in the atmosphere,** p. 126–135
- Agy, V.: **Spiral patterns in geophysics,** p. 136–140
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- LaChapelle, E. R.: **Recent progress in North American avalanche forecasting and control,** p. 679–685
- Kick, W.: **The first glaciologists in Central Asia according to new studies in the Department of Manuscripts at the Bavarian State Library,** p. 687–692
- Dineley, D. L.: **Notes on the recent advance and retreat of Sefströmbreen in Ekmanfjorden, Vestspitsbergen,** p. 693–697
- Hallett, J.: **Crystal growth and the formation of spikes in the surface of super-cooled water,** p. 698–704
- Smith, Jeremy: **Glacier problems in South Georgia,** p. 705–714
- Havens, James M.: **An historical survey of the late-season snow-bed in Tuckerman Ravine, Mount Washington, U.S.A.,** p. 715–723
- Dunbar, Moira: **Thrust structures in young sea ice,** p. 724–732
- Longley, Richmond W.: **Snow depth and snow density at Resolute, Northwest Territories,** p. 733–738
- Odell, N. E.: **The mountains and glaciers of New England,** p. 739–744
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- Suslov, V. F.: **On the advance of certain glaciers of the North-western Pamirs,** p. 762–764
- Whittow, John B.: **Some observations on the snowfall of Ruwensori,** p. 765–772
- Mellor, Malcolm: **Temperature gradients in the Antarctic ice sheet,** p. 773–782
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- Barlow, John P.: **Spring changes in phytoplankton abundance in a deep estuary, Hood Canal, Washington,** p. 53–67

Barnes, Clifford A. and Collias, Eugene E.: **Some considerations of oxygen utilization rates in Puget Sound,** p. 68–80

Barnes, Harold and Gonor, Jefferson J.: **Neurosecretory cells in the Cirripede,** *Pollicipes polymerus* **J. B. Sowerby,** p. 81–102

Bruun, Anton F.: **On the restricted distribution of two deep-sea fishes,** *Borophryne apogon* **and** *Stomias colubrinus*, p. 103–112

Carruthers, J. N.: **Description of a prototype gauge to measure magnitude and direction of hydrowire slope** *in situ* **between reversing bottles at all depths and under all conditions of ship drift,** p. 113–119

Chow, Tsaihwa J.: **Lead isotopes in sea water and marine sediments,** p. 120–127

Cooper, L. H. N.: **A system for international exchange of samples for trace element analysis of ocean water,** p. 128–132

Emery, K. O.: **Wave patterns off southern California,** p. 133–140

Fleagle, R. G.; Deardorff, J. W. and Badgley, F. I.: **Vertical distribution of wind speed, temperature and humidity above a water surface,** p. 141–157

Fleming, Richard H.: **Notes concerning the halocline in the northeastern Pacific Ocean,** p. 158–173

Føyn, Ernst: **Hydrographic and biological investigations in Oslofjord by means of the densigraph and the oxymeter,** p. 174–177

Goldberg, Edward D.: **Determination of opal in marine sediments,** p. 178–182

Gould, Howard R. and Budinger, Thomas F.: **Control of sedimentation and bottom configuration by convection currents, Lake Washington, Washington,** p. 183–198

Groves, Gordon W. and Munk, Walter: **A note on tidal friction,** p. 199–214

Henry, Dora Priaulx: **Intertidal barnacles of Bermuda,** p. 215–234

Hidaka, Koji: **Boundaries in the theory of ocean currents,** p. 235–246

Jeffrey, Lela M. and Hood, Donald W.: **Organic matter in sea water: an evaluation of various methods for isolation,** p. 247–271

Johnson, Martin W.: **Observations on inshore plankton collected during summer 1957 at Point Barrow, Alaska,** p. 272–281

Ketchum, Bostwick H.; Vaccaro, Ralph F. and Corwin, Nathaniel: **The annual cycle of phosphorus and nitrogen in New England coastal waters,** p. 282–301

Koczy, F. F. and Titze, Heinz: **Radium content of carbonate shells,** p. 302–311

Krey, Johannes: **Chemical determinations of net plankton, with special reference to equivalent albumin content,** p. 312–324

Laevastu, Taivo: **The occurrence of pigments in marine sediments,** p. 325–334

Lyman, John; Barquist, Richard F. and Wolf, A. V.: **A new method for direct determination of salinity,** p. 335–340

Marshall, S. M. and Orr, A. P.: **Some uses of antibiotics in physiological experiments in sea water,** p. 341–346

Merriman, Daniel and Merriman, Mary: **Sir C. Wyville Thomson's letters to Staff-Commander Thomas H. Tizard, 1877–1881,** p. 347–374

Miller, Robert C.: **The relict fauna of Lake Merced, San Francisco,** p. 375–382

Miyake, Yasuo and Saruhashi, Katsuko: **Distribution of man-made radioactivity in the north Pacific through summer 1955,** p. 383–389

Pate, John B. and Robinson, Rex J.: **The** (*Ethylenedinitrilo*) **tetraacetate titration of calcium and magnesium in ocean waters, Pt. 1, Determination of calcium,** p. 390–402

Pritchard, Austin W.; Florey, Elisabeth and Martin, Arthur W.: **Relationship between metabolic rate and body size in an elasmobranch** (*Squalus suckleyi*) **and in teleost** (*Ophiodon elongatus*), p. 403–411

Pritchard, Donald W.: **The equations of mass continuity and salt continuity in estuaries,** p. 412–423

Proudman, Joseph: **A damped Kelvin-wave of general form,** p. 424–428

Rakestraw, Norris W.: **Particulate matter in the oxygen-minimum layer,** p. 429–431

Redfield, Alfred C.: **The influence of the Continental Shelf on the tides of the Atlantic Coast of the United States,** p. 432–448

Richards, Francis A.: **Dissolved silicate and related properties of some western North Atlantic and Caribbean waters,** p. 449–465

Riley, J. P. and Sinhaseni, Prapas: **Chemical composition of three manganese nodules from the Pacific Ocean,** p. 466–482

Rochford, David J.: **Characteristics and flow paths of the intermediate depth waters of the southeast Indian Ocean,** p. 483–504

Swan, Emery F.: **Growth and variation in sea urchins of York, Maine,** p. 505–522

Tully, John P.: **On structure, entrainment, and transport in estuarine embayments,** p. 523–535

Waldichuk, Michael: **Some oceanographic characteristics of a polluted inlet in British Columbia,** p. 536–551

Wooster, Warren S. and Taft, Bruce A.: **On the reliability of field measurements of temperature and salinity in the ocean,** p. 552–566

Yentsch, Charles S. and Scagel, Robert F.: **Diurnal study of phytoplankton pigments: an *in situ* study in East Sound Washington,** p. 567–583

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Friedlander, S. K.: **Similarity considerations for the particle-size spectrum of a coagulating, sedimenting aerosol,** p. 479–483

Rosenthal, Stanley L.: **A simplified linear theory of equatorial easterly waves,** p. 484–488

Reed, Richard J. and Kunkel, Bruce A.: **The Arctic circulation in summer,** p. 489–506

Rapp, R. R.: **The accuracy of winds derived by the radar tracking of chaff at high altitudes,** p. 507–514

Donn, William L. and McGuinness, William T.: **Air-coupled long waves in the ocean,** p. 515–521

Winston, Jay S.: **Some new data on the longitudinal dimensions of planetary waves,** p. 522–531

Conover, John H.: **Cirrus patterns and related air motions near the jet stream as derived by photography,** p. 532–546

Storebø, Per B.: **The exchange of air between stratosphere and troposphere,** p. 547–554

Riehl, Herbert and Higgs, Ralph: **Unrest in the upper stratosphere over the Caribbean Sea during January 1960,** p. 555–561

Pietrowski, E. L.: **An observation of lightning in warm clouds,** p. 562–563

Murcray, W. B. and Echols, C.: **Some observations on the flow of heat through cold snow,** p. 563–566

Möller, Fritz: **Correlations between the tropospheric radiation balance and certain meteorological quantities,** p. 566–568

Jordan, C. L.: **Apparent diurnal temperature variations from radiosonde observations,** p. 569–571

Gates, W. Lawrence: **Note on the suppression of the oscillation (weak instability) of first-forward-then-centered time differences in numerical integration,** p. 572–574

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Afanas'eva, V. B.: **Ispytanie metoda prognoza, osnovannogo na preemstvennosti sinopticheskikh protsessov,** [Test of a forecasting method based on the succession of synoptic processes], p. 3–10

Chang, Chia-ch'eng: **Mnogoletnie stednie kharakteristiki nekotorykh meteorologicheskikh elementov i tsirkuliatsii nad Kitaem v zimnem polugodii,** [Long period mean characteristics of certain meteorological elements and circulation over China during winter], p. 11–26

Chang, Chia-ch'eng: **Nekotorye vzgliady na prirodu kitaĭskikh mussonov,** [Certain views on the nature of the Chinese monsoon], p. 27–42

Chang, Chi-chia: **Srednie mnogoletnie kharakteristiki atmosfernoĭ tsirkuliatsii i rezhima pogody nad Kitaem v letnee polugodie,** [Long period mean characteristics of atmospheric circulation and weather regime over China in summer], p. 43–62

Chang, Chi-chia: **Mnogoletnee izmenenie nekotorykh meteorologicheskikh elementov i povtoriaemosti taĭfunov nad Kitaem i ikh sviaz' s epokhal'nymi preobrazovaniiami form W, C, E,** [Long period change of certain meteorological elements and the frequency of typhoons over China and relation to epochal modifications of the W, C, and E forms], p. 63–78

Dunaeva, A. V.: **Sviaz' sutochnykh anomaliĭ temperatury vozdukha s raznovidnostiami protsessov vostochnoĭ formy tsirkuliatsii,** [Relation between daily air temperature anomalies and the variety of processes of eastern circulation], p. 79–86

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Vitel's, L. A.: **Mnogoletnie izmeneniia povtoriaemosti form atmosfernoĭ tsirkuliatsii i ikh preobrazovaniĭ sviazi s solnechnoĭ aktivnost'iu,** [Long period changes in the recurrence of atmospheric circulation types and their modification in relation to solar activity], p. 95–115

Vitel's, L. A.: **Solnechnyĭ kalendar' ul'trapoliarnykh protsessov,** [Solar calendar of ultrapolar processes], p. 116–129

Shapaev, V. M.: **O passatnoĭ tsirkuliatsii nad Atlanticheskim okeanom,** [Trade wind circulation over the Atlantic Ocean], p. 130–148

Spitsyna, N. L.: **Primenenie nekotorykh obshchikh zakonomernosteĭ peremeshcheniia tsiklonov k tsiklonam, vyzyvaiushchim ugrozu navodneniia r. Neve,** [Application of certain general principles of cyclone movement to cyclones causing flood hazards in the Neva River], p. 149–154

No. 97, 1960

Imianitov, I. M.: **Ob izmenenii elektricheskogo polia atmosfery vo vremia solnechnykh zatmeniĭ,** [Change in the atmospheric electric field during solar eclipses], p. 3–4

Imianitov, I. M.: **Elektricheskie polia v moshchnykh kuchevykh i grozovykh oblakakh i ispol’zovanie dannykh o nikh dlia obkhoda samoletami groz,** [Electric fields in large cumulus and storm clouds and the use of data on these fields by airplanes for avoiding storms], p. 5–15

Imianitov, I. M. and Mikhaĭlovskaia, V. V.: **Opyt issledovaniia zariadov chastits osadkov v svobodnoĭ atmosfere,** [Experimental investigation of charges of precipitation particles in the free atmosphere], p. 16–33

Lobodin, T. V.: **Nekotorye rezul’taty issledovaniĭ elektricheskogo polia nad okeanami,** [Certain results of investigations on the electric field over oceans], p. 34–38

Loch, B. F.: **Sutochnyĭ khod chisla grozovykh razriadov,** [Diurnal variation of the number of thunderstorm discharges], p. 39–42

Kolokolov, V. P. and Semenov, K. A.: **Izmerenie zariada dozhdia v Voeĭkovo v 1958 g.,** [Measurement of the charge of rain at Voeĭkovo in 1958], p. 43–47

Makhotkin, L. G.: **Ob izmenenii zariadov kapel’ pri isparenii,** [Change in the charge of drops during evaporation], p. 48–50

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Izergin, A. M.: **Issledovanie sostavliaiushchikh vertikal’nogo elektricheskogo toka na zemliu,** [Investigation on the components of the vertical electric current directed toward the ground], p. 87–96

Tammet, Kh. F. and Sepper, E. V.: **K teorii elektrostaticheskogo fliuksmetra,** [Theory of the electrostatic flux meter], p. 97–100

Filippov, A. Kh.: **Ispol’zovanie gal’vanicheskoĭ vanny dlia model’nykh izmereniĭ pri izuchenii elektrichestva atmosfery,** [Use of a galvanic bath for model measurements in the study of atmospheric electricity], p. 101–103

Filippov, A. Kh. and Tiutrin, A. I.: **Uproshchennaia registratsiia gradienta potentsiala elektricheskogo polia atmosfery,** [Simplified recording of the potential gradient of the atmospheric electric field], p. 104–105

Furman, A. M.: **Raspredelenie po podvizhnosti i kontsentratsii legkikh i srednikh ionov v atmosfere,** [Distribution according to mobility and concentration of light and medium atmospheric ions], p. 106–115

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Kagan, R. L.: **K uchetu vliianiia kondensatsionnykh pritokov tepla i stratosfery na izmenenie polia davleniia,** [Influence of condensation heat flux in the stratosphere on changes in a pressure field], p. 15–36

Bogdanova, N. P.: **Priblizhennaia otsenka vliianiia tepla kondensatsii na izmenenie nazemnogo davleniia,** [Approximate evaluation of the influence of condensation heat on pressure changes near the ground], p. 37–42

Tu, Hsing-yuan: **Utochnennaia skhema ucheta nerovnosteĭ zemnoĭ poverkhnosti v chislennykh metodakh prognoza,** [Precise scheme for taking into account irregularities of the earth's surface in numerical forecasting methods], p. 43–67

Gandin, L. S.: **Raschetnye metody analiza kart,** [Calculation methods for chart analysis], p. 48–66

Gandin, L. S.: **Zadacha ob optimal’noĭ interpoliatsii,** [Problem of optimum interpolation], p. 67–76

Gandin, L. S. and Bagrova, E. I.: **O strukture polia vysot poverkhnosti 500 millibar,** [Structure of the 500 mb surface field], p. 77–92

Tu, Hsing-yüan: **Prostranstvennaia zadacha chislennogo prognoza baricheskogo polia s uchetom vliianiia vysokogornykh plato,** [Dimensional problem of forecasting the pressure field, taking into account the influence of high mountain plateaus], p. 93–104

Tu, Hsing-yüan: **K voprosu o gidrodinamicheskoĭ teorii frontal'nogo tsiklogeneza,** [Hydrodynamic theory of frontal cyclogenesis], p. 105–111

Arrago, L. R.: **O vertikal'nykh tokakh v atmosfere nad termicheski neodnorodnoĭ poverkhnost'iu,** [Vertical currents in the atmosphere above a thermally inhomogeneous surface], p. 112–122

Shvets, M. E. and Kagan, R. L.: **K voprosu o predvychislenii vertikal'noĭ skorosti v atmosfere,** [Precalculation of vertical velocity in the atmosphere], p. 123–130

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Selezneva, E. S. and Churinova, M. P.: **Nekotorye kharakteristiki sostoianiia atmosfery pri razvitii kuchevykh i kuchevo-dozhdevykh oblakov,** [Certain characteristics of the state of the atmosphere during the development of cumulus and cumulonimbus clouds], p. 3–20

Shishkin, N. S.: **Issledovaniia raspada konvektivnykh oblakov pri neustoĭchivoĭ stratifikatsii atmosfery,** [Investigations on the dissipation of convective clouds when the atmosphere is unstably stratified], p. 21–49

Nikandrova, G. T. and Khimach, M. A.: **Kharakteristiki mikrostruktury pereokhlazhdennykh oblakov,** [Characteristics of the microstructure of supercooled clouds], p. 50–57

Nikandrova, G. T. and Fridman, Iu. S.: **K voprosu o metodike opredeleniia kharakteristik raspredeleniia razmerov kapel' v oblakakh,** [Method of determining the characteristics of droplet size distribution in clouds], p. 58–62

Kotov, N. F.: **Radiolokatsionnye kharakteristiki livneĭ i groz,** [Radar characteristics of showers and thunderstorms], p. 63–93

Sal'man, E. M.: **K voprosu ob optimal'noĭ dline volny radiolokatora dlia obnaruzheniia oblachnosti i osadkov,** [Optimum radar wave length for detecting clouds and precipitation], p. 94–102

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Proskuriakov, A. K. and Kabanova, K. S.: **Opyt otsenki tochnosti ucheta stoka na gidroelektrostatsiiakh,** [Attempt at estimating the accuracy of discharge calculations at hydroelectric stations], p. 3–29

Gavrilov, A. M.: **Rezul'taty odnoĭ naturnoĭ tarirovki vodoslivnogo otverstiia v plotine maloĭ GES,** [Results of one case of a natural calibration of a spillway in a small hydroelectric power plant], p. 30–35

Dimaksian, A. M.: **Distantsionnoe izmerenie urovnia podzemnykh vod,** [Remote measurement of the ground water level], p. 36–45

Burtsev, P. N.: **Sushchnost' modernizatsii vertushki VZHM-3,** [Modernization of a VZHM-3 current meter], p. 46–50

Burtsev, P. N.: **Vliianie momenta inertsii lopastnogo vinta na pokazaniia gidrometricheskoĭ vertushki,** [Influence of the moment of inertia of a blade propeller on the readings of a hydrometric gage], p. 51–66

Zav'ialov, K. D.: **Registrator distantsionnogo samopistsa urovnia,** [Recording element of a remote automatic water level recorder], p. 67–70

Illarionov, V. I.: **Opyt primeneniia prisposobleniia dlia prinuditel'nogo sliva v samopistsakh dozhdia,** [Experimental use of a device for the forced emptying of an automatic rain recorder], p. 71–75

Vinogradov, V. M.: **Novaia gidrometricheskaia lebedka s povorotnoĭ streloĭ,** [New hydrometric winch with a revolving crane arm], p. 76–80

Vinogradov, V. M.: **Ledovyĭ zenker i prisposoblenie dlia opuskaniia vertushki pri rabote so l'da,** [Ice countersink and a device for lowering a current meter during work with ice], p. 81–83

Konstantinov, A. R.: **Trekhlopastnyĭ anemograf-pribor dlia registratsii gorizontal'noĭ i vertikal'noĭ sostavliaiushchikh skorosti vetra v prizemnom sloe atmosfery,** [Three-blade anemograph, an instrument for recording the horizontal and vertical components of wind speed in the air layer near the ground], p. 84–95

No. 74, 1960

Makkaveev, V. M.: **O strukture krupnomasshtabnoĭ pul'satsii otkrytykh potokov,** [Structure of large-scale pulsations in open streams], p. 3–21

Popov, I. V.: **Issledovanie morfologii rek pri reshenii zadach khoziaĭstvennogo osvoeniia poĭm,** [Studying river morphology when solving problems pertaining to the agricultural utilization of flood plains], p. 22–54

Sokolov, N. N.: **Issledovaniia na Tsimlianskom vodokhranilishche s primeneniem materialov aerofotos"emki,** [Investigations of the Tsimlyansk Reservoir on the basis of aerial photography data], p. 55–70

Grigor'eva, O. G.: **Laboratornoe opredelenie soprotivliaemosti gornykh porod volnovomu vozdeĭstviiu,** [Laboratory determination of the resistance of rock to the action of waves], p. 71–87

No. 75, 1960

Makarevich, T. N.: **Nekotorye osobennosti ledovogo rezhima rek Evropeĭskogo kontinenta,** [Certain characteristics of the ice regime of European rivers], p. 3–13

Gurevich, M. I.: **Prognozy letnego i osennego stoka po gidrologicheskim i meteosinopticheskim faktoram (na primere r. Kamy),** [Forecasting summer and autumn discharge from hydrological and meteorological-synoptic factors taking the Kama River as an example], p. 14–62

Norvatov, A. M.; Remizova, L. K. and Koroleva, N. P.: **Dolgosrochnyĭ fonovyĭ prognoz vodnosti letneĭ mezheni rek lesostepnoĭ zony (na primere rek basseĭnov Volgi i Dona),** [Long range background forecast of the volume of water during summer low water in rivers of the forest-steppe zone taking the rivers of the Volga and Don basins as examples], p. 63–93

No. 76, 1960

Vol'ftsun, I. B.: **Analiz formirovaniia maksimal'nogo dozhdevogo stoka i metodika ego rascheta,** [Analysis of the formation of maximum rainfall runoff and method of calculating it], p. 5–55

Vol'ftsun, I. B. and Krestovskiĭ, O. I.: **Eksperimental'noe izuchenie transformatsii stoka talykh vod makroponizheniiami na logakh VNIGL,** [Experimental study on the transformation of meltwater runoff by macrodepressions at gaging stations of the VNIGL], p. 56–66

Konstantinov, A. R.; Fedorova, T. G. and Golubev, V. S.: **Vliianie razlichnykh faktorov na pokazaniia vodnykh ispariteleĭ, ustanovlennykh na sushe,** [Influence of various factors on the readings of evaporation tanks placed on the ground], p. 67–111

Konstantinov, A. R. and Fedorova, T. G.: **Termicheskiĭ rezhim Valdaĭskogo ozera i raspredelenie meteoelementov nad ego poverkhnost'iu,** [Thermal regime of Lake Valday and the distribution of meteorological elements above its surface], p. 112–151

Konstantinov, A. R. and Golubev, V. S.: **O vozmozhnosti proizvodstva gradientnykh izmereniĭ temperatury i vlazhnosti vozdukha s pomoshch'iu stantsionnykh psikhrometrov v budkakh,** [Possibility of measuring air temperature and humidity gradients by stationary psychrometers in a shelter], p. 152–167

Fedorov, S. F.: **O rezul'tatakh nabliudeniĭ nad vlazhnost'iu pochvy s pomoshch'iu pochvennogo vlagomera IVP-53,** [Results of soil moisture measurements by means of the IVP-53 soil moisture meter], p. 168–178

Meteoritika, Moscow, Vol. 18, 1960

Fesenkov, V. G.: **Osnovnye dostizheniia meteoritiki za poslednee vremia,** [Main achievements of meteoritics in the last years], p. 5–16

Krinov, E. L.: **Itogi izucheniia padeniia Tungusskogo meteorita (tezisy doklada),** [Results of investigations on the fall of the Tungus meteorite (abstract of lecture)], p. 17–18

Staniukovich, K. P.: **Ob effektakh padeniia bol'shikh meteoritov (tezisy doklada),** [Effects of the fall of large meteorites (abstract of lecture)], p. 19

Levin, B. Iu.: **Iskusstvennye sputniki Zemli i meteornye tela,** [Artificial earth satellites and meteoric bodies], p. 20–25

Aaloe, A.: **Ilumetsaskie kratery Estonskoĭ SSR,** [Ilumetsa craters in Estonia], p. 26–31

Bonev, N.: **O proiskhozhdenii asteroidov i meteoritov,** [Origin of asteroids and meteorites], p. 32–34

Vorob'ev, G. G.: **Issledovanie sostava tektitov, 2, Moldavity,** [Study of the composition of tectites, Pt. 2, Moldavites], p. 35–39

Pokshivnitskiĭ, E.: **Ob udel'nom vese meteoritov,** [Specific gravity of meteorites], p. 41–47

D'iakonova, M. I. and Kharitonova, V. Ia.: **Rezul'taty khimicheskogo analiza nekotorykh kamennykh i zheleznykh meteoritov kollektsii AN SSSR,** [Results of a chemical analysis of certain stone and iron meteorites in the collection of the Academy of Sciences of the U.S.S.R.], p. 48–67

Alekseeva, K. N.: **Novye dannye o fizicheskikh svoĭstvakh kamennykh meteoritov,** [New data on the physical properties of stone meteorites], p. 68–76

Iavnel', A. A.; Borovskiĭ, I. B.; Il'in, N. P. and Marchukova, I. D.: **Opredelenie sostava faz meteoritnogo zheleza metodom lokal'nogo rentgenospektral'nogo analiza (tezisy doklada),** [Determination of the phase composition of meteoritic iron by the method of local X-ray spectral analysis (abstract of lecture)], p. 77

Vdovykin, G. P.: **Predvaritel'nye rezul'taty liuminestsentno-bituminologicheskogo issledovaniia chetyrekh uglistykh khondritov,** [Preliminary results of luminescent-bituminological investigations of four carbonaceous chondrites], p. 78–82

Starik, I. E. and Shats, M. M.: **Novye dannye po opredeleniiu soderzhaniia urana v meteoritakh,** [New data on the determination of the uranium content in meteorites], p. 83–87

Starik, I. E.; Sobotovich, E. V. and Shats, M. M.: **Opredelenie vozrasta meteoritov svintsovo-izotopnym metodom,** [Determination of the age of meteorites by the lead-isotope method], p. 88–91

Vinogradov, A. P.; Zadorozhnyĭ, I. K. and Knorre, K. G.: **Ob argone v meteoritakh,** [Argon in meteorites], p. 92–99

Gerling, E. K. and Levskiĭ, L. K.: **Produkty kosmicheskoĭ radiatsii v Sikhote-Alinskom meteorite,** [Products of cosmic radiation in the Sikhote-Alinsk meteorite], p. 100–105

Pokshivnitskiĭ, E.: **Meteorit Zaboritsa,** [Zaboritsa meteorite], p. 106–110

Bgatov, V. I. and Cherniaev, Iu. A.: **O meteornoĭ pyli v shlikhovykh probakh,** [Meteoric dust in schlich specimens], p. 111–112

Iudin, I. A.: **O nakhozhdenii meteornoĭ pyli v raĭone padeniia kamennogo meteoritnogo dozhdia Kunashak,** [Discovery of meteoric dust in the fall area of the Kunashak stone meteoritic rain], p. 113–118

Ovchinnikova, T. N.: **Uchebnaia ekspozitsiia po meteoritike v Muzee zemlevedeniia MGU,** [Educational exhibit on meteoritics at the Earth Science Museum of the Moscow State University], p. 119–122

Fesenkov, V. G.: **K teorii lunnykh zatmeniĭ,** [Theory of lunar eclipses], p. 125–135

Krinov, E. L.: **Nekotorye soobrazheniia o sbore meteoritnogo veshchestva v poliarnykh stranakh,** [Certain considerations on the collection of meteoritic matter in polar regions], p. 136–140

Zadorozhnyĭ, I. K.: **Mass-spektral'noe opredelenie soderzhaniia inertnykh gazov v zheleze,** [Mass-spectral determination of the content of inert gases in iron], p. 141–143

Penchev, N. P.; Pencheva, E. N. and Bonchev, P. R.: **O khimicheskom sostave meteorita Gumoshnik (Bolgariia),** [Chemical composition of the Gumoshnik meteorite (Bulgaria)], p. 144–146

Iudin, I. A.: **Mineragraficheskoe issledovanie kamennogo meteorita Nikol'skoe,** [Mineragraphic investigation of the Nikol'skoe meteorite], p. 147–154

Kolomenskiĭ, V. D.: **Rezul'taty rentgenometricheskogo issledovaniia kamennogo meteorita Nikol'skoe,** [Results of X-ray investigations of the Nikol'skoe stone meteorite], p. 155–159

Meteorologiia i Gidrologiia, Moscow, No. 7, July 1960

Dubov, A. S.: **Vliianie rel'efa na peremshchenie baricheskikh tsentrov,** [Influence of topography on the movement of pressure centers], p. 3–8

Vitel's, L. A.: **O vozmozhnoĭ prichine izmeneniĭ solnechno-atmosfernykh sviazeĭ,** [Possible cause of changes in solar-atmospheric relationships], p. 9–13

Belinskiĭ, N. A. and Glagoleva, M. G.: **Metod rascheta temperatury vody v verkhnem sloe moria v tepluiu chast' goda,** [Method of calculating the temperature of sea surface water during the warm season], p. 14–21

Iudin, M. I.: **Sinopticheskiĭ material dlia ispytaniia chislennykh metodov prognoza,** [Synoptic data for testing numerical forecast methods], p. 22–25

Il'inskiĭ, O. K.: **Rezhim nizhneĭ troposfery v raĭone Vladivostoka v period letnego mussona,** [Regime of the lower troposphere in the Vladivostok region during the summer monsoon], p. 25–27

Kuznetsov, I. A.: **O tochnosti rascheta maksimal'nykh raskhodov vody pri otsutsvii ili nedostatochnosti gidrometricheskikh dannykh,** [Precision of maximum water discharge calculation in the absence or lack of hydrometric data], p. 28–30

Mirtskhulava, Ts. E.: **Ob odnom prieme ucheta sil stsepleniia pri otsenke soprotivliaemosti sviaznykh gruntov razmyvu,** [Method of assessing adhesive strength in evaluating the resistance of the ground to erosion], p. 30–32

Narodetskaia, R. Ia.: **Opredelenie koeffitsienta izmenchivosti godovogo stoka neizuchennykh rek Primorskogo kraia,** [Determination of coefficient of annual runoff variability of unexplored rivers of the Maritime Territory], p. 32

Kostianitsyn, M. N.: **O postanovke nabliudeniĭ nad dvizheniem nanosov i zanosimost'iu v pribrezhnoĭ polose moria i ust'iakh rek,** [Observations on alluvium movements and sedimentation in the coastal zone of the sea and estuaries], p. 33–35

Latun, V. S.: **O kharaktere zavisimosti koeffitsienta gorizontal'nogo turbulentnogo peremeshivaniia v more ot perioda osredneniia pul'satsiĭ skorosti techeniia,** [Nature of the dependence of the horizontal turbulent mixing coefficient in the sea on the period of averaging the velocity current oscillations], p. 35–36

Kharshan, Sh. A.; Gotlib, Ia. L. and Razzorenov, F. F.: **Gidrometeorologicheskoe obsluzhivanie perekrytiia r. Angary na stroitel'stve Bratskoĭ GES,** [Hydrometeorological service during the damming of the Angara River at the construction site of the Bratskaya hydro-electric power station], p. 37–40

Kaulina, K. I.: **Sravnenie rezul'tatov nabliudeniĭ nad ispareniem s pochvy po trem metodam,** [Comparison of observations on soil evaporation using three different methods], p. 41–42

Maliavskiĭ, B. K.: **Opredelenie skorosti i napravleniia poverkhnostnykh techeniĭ i raskhodov vody v rekakh aerometodom,** [Determination of the velocity and direction of surface currents and water discharge in rivers by means of aerial surveys)] p. 42–44

Maksimov, S. A.: **[Biographical sketch of] Vladimir Aleksandrovich Mikhel'son (1860–1960),** p. 45–48

Literatura po meteorologii, gidrologii i okeanografii za 1959 god (prodolzhenie), [Literature on meteorology, hydrology and oceanography in 1959], p. 51–55

Petrenko, N. V.: **Resheniia Vtoroĭ sessii Komissii aviatsionnoĭ meteorologii Vsemirnoĭ meteorologicheskoĭ organizatsii,** [Resolutions of the Second Session of the Aviation Meteorology Commission of the WMO], p. 56–60

Meteorologische Rundschau, Berlin, Vol. 13, No. 2, March/April 1960

Weickmann, L.: **Häufigkeitsverteilung und Zugbahnen von Depressionen im Mittleren Osten** [Frequency distribution of paths of depressions in the Middle East], p. 33–38

Attmannspacher, W.: **Über die Existenz einer hochstratosphärischen Nullschicht 1. Art,** [Existence of a zero layer of the 1st type in the high stratosphere], p. 38–45

Hartmann, Wilhelm: **Sonnenscheindauer und Bewölkung,** [Sunshine duration and cloudiness], p. 45–50

Neuwirth, R.: **Regionale Aerosoluntersuchungen,** [Regional aerosol investigations], p. 51–54

Lorenz, Dieter: **Untersuchungen mit dem ARDONOX, einem neuen Gerät zur Messung von Oberflächentemperaturen,** [Investigations with the ARDONOX, a new instrument for measuring surface temperatures], p. 54–57

Partl, Willibald and Tank, H. J.: **Atmosphärische Vorgänge aus der Schau eines Verkehrsflugzeugführers,** [Atmospheric experiences of a commercial airplane pilot], p. 57–61

Voigts, Heinrich: **Die Meteorologie in den Höheren Schuler,** [Meteorology in highschools], p. 62–63

Vol. 13, No. 3, May/June 1960

Möller, F.: **Der Strahlungshaushalt der Troposphäre,** [Radiation balance of the troposphere], p. 76–77

Faust, Heinrich: **Die Schwachwindschicht in der unteren Stratosphäre als Nullschicht,** [The weak wind layer in the lower stratosphere as the zero layer], p. 75–85

Harsányi, E.: **Nullschicht und Drucktemperaturkurven,** [Zero layer and pressure-temperature curves], p. 85–86

Wagemann, H.: **Randbedingungen, eine Voraussetzung für reale Bewegungen der Atmosphäre,** [Limiting conditions, a basis for real movement of the atmosphere], p. 86–89

Schwerdtfeger, Werner: **Der südliche Polarwirbel,** [The southern polar vortex], p. 89–93

Hofmann, Alfred: **Monatsvorhersage für Deutschland: Prüfungsergebnisse aus den letzten 3 Jahren,** [Monthly forecasts for Germany: results of verifications in the last 3 years], p. 93–94

Vol. 13, No. 4, July/Aug. 1960

Butzer, Karl W.: **Dynamic climatology of large-scale European circulation patterns in the Mediterranean area,** p. 97–105

Meyer, Hans Klaus: **Die kalte arktische Stratosphäre im Dezember 1959 und ihre Auswirkung auf die Strömungsverhältnisse in Mitteleuropa,** [Cold arctic stratosphere of December 1959 and its effect on currents in Central Europe], p. 106–111

Weise, R.: **Studien über den Anschluss des Mikroklimas an das lokale Makroklima,** [Studies on the relation between microclimate and local macroclimate], p. 111–115

Johannsen, H. H.: **Gebietsmittel des Niederschlags im Wasserwirtschaftsjahr 1959,** [Areal precipitation mean in the water budget year of 1959], p. 116

Volz, F. E.: **Einige Beobachtungen ungewöhnlicher Regenbogen und Hinweise auf wünschenswerte Beobachtungen,** [Some observations of unusual rainbows and hints on desirable observations], p. 117–118

Fink, C. and Horney, G.: **Experimentelle Bestimmung der Trägheit des Radiosondenbimetalls beim Aufstieg,** [Experimental determination of the inertia of radiosonde bi-metals during ascent], p. 118–119

Fink, C.: **Über die Korrektion der Temperaturumkehrpunkte eines Radiosondenaufstieges,** [Corrections to the temperature reversal point of a radiosonde ascent], p. 120–122

Schulze, A.: **Die Sonnenscheindauer im Juli, August und September 1959 im deutschen Bundesgebiet einschliesslich des niederländischen Grenzraumes,** [Sunshine duration in July, August and September 1959 in the German Federal Republic, including the neighboring area of the Netherlands], p. 122–124

Schneider, Hanns-Dieter: **Temperaturänderungen in Troposphäre und unterer Stratosphäre beim Kaltfrontdurchgang,** [Temperature changes in the troposphere and the lower stratosphere during the passage of a cold front], p. 124–126

Monthly Weather Review, Wash., D. C., Vol. 88, No. 8, Aug. 1960

Spiegler, David B.: **An analysis of barotropic forecast errors in cases of rapid sea level cyclogenesis,** p. 263–268

Harrell, Wayne and Richardson, E. Arlo: **Measurement of sensible air-ground interface temperatures,** p. 269–274

Notice of change in month designation of Monthly Weather Review, p. 274

Bosen, Julius F.: **A formula for approximation of the saturation vapor pressure over water,** p. 275–276

Wark, David Q. and Wolk, M.: **An extension of a table of absorption for Elsasser bands [Notice of available reprint],** p. 276

Angell, J. K.: **Use of tetroons for mesometeorological investigations,** p. 277–278

Colson, Dever: **High level thunderstorms of July 31–August 1, 1959,** p. 279–285

Stark, L. P.: **The weather and circulation of August 1960: a month dominated by a circulation reversal,** p. 286–293

Moscow. Tsentral'nyĭ Institut Prognozov, Trudy, No. 96, 1960

Afanas'ev, A. I.: **Ob ispol'zovanii materialov aerofotos"emok skhoda snezhnogo pokrova pri raschetakh snegotaianiia,** [Use of materials from aerial photographic surveys of the disappearance of the snow cover in snow melt calculations], p. 3–23

Afanas'ev, A. I.: **Teoreticheskie i empiricheskie krivye raspredeleniia pokrytosti mestnosti snegom,** [Theoretical and empirical curves of the distribution of areas covered by snow], p. 24–34

Vazhnov, A. N.: **O podzemnom pitanii gornykh rek v period polovod'ia i letneĭ mezheni,** [Underground alimentation of mountain rivers during the flood period and the period of low water in summer], p. 35–55

Vazhnov, A. N.: **K metodike prognozov letne-osennego stoka na rekakh Zakavkaz'ia,** [Method of forecasting the summer-autumn discharge of Transcaucasian rivers], p. 56–75

Kharshan, Sh. A. and Rimashevskiĭ, A. I.: **Nabliudeniia nad snezhnym pokrovom na Oĭskom khrebte (Zapadnyĭ Saian),** [Snow cover observations in the Oisk Range (Western Saian)], p. 76–84

Zhidikov, A. P.: **Raschet neustanovivshegosia dvizheniia vody po metodu G. P. Kalinina i O. I. Miliukova dlia nizhnego b'efa Rybinskoĭ GES pri sutochnom regulirovanii,** [Calculation of the unstable movement of water according to the method of G. P. Kalinin and P. I. Miliukov for the lower waters of the Rybinsk Hydroelectric Power Station during daily regulation], p. 85–125

Nuovo Cimento, Bologna, Supplement No. 2 to Ser. 10, Vol. 9, 1958

Cottini, C.; Gatti, E. and Malvicini, A.: **Strumento per la misura della contaminazione dell'aria dovuta a pulviscolo contenente uranio, insensibile alla radioattività dell'aria,** [Instrument for the measurement of atmospheric contamination from dust containing uranium, insensible to radioactivity of the atmosphere], p. 381–384

Donald, R. A. and Evans, G. R.: **Examples of direct emission of β-rays after capture of a μ-meson by an argon nucleus,** p. 385–389

Supplement No. 1 to Ser. 10, Vol. 12, 1959

Singer, S. F.: **On the origin of the charge spectrum of the primary cosmic radiation,** p. 120–121

Supplement No. 1 to Ser. 10, Vol. 13, 1959

Lehnert, B.: **Plasma physics on cosmical and laboratory scale,** p. 59–110
Schatzman, E.: **Le plasma stellaire,** [Stellar plasma], p. 166–188
Biermann, L.: **Stellar atmospheres as a plasma,** p. 189–204
Gallet, R.: **Propagation and production of electromagnetic waves in a plasma,** p. 234–256
de Jager, C.: **Optical and radiophenomena associated with a solar activity centre,** p. 284–290
de Jager, C.: **Dynamical features of the chromosphere,** p. 291–298
Giovanelli, R. G.: **Solar disturbances producing type II radio bursts,** p. 299–301
Giovanelli, R. G.: **Flare surges, puffs and type III bursts,** p. 302–304
Kiepenheuer, K. O.: **The observability of hydromagnetic phenomena on the sun,** p. 305–310
Wilhelmsson, H.: **The scattering of electromagnetic waves by an electron beam,** p. 311–317
Gold, T.: **Magnetic field in the solar system,** p. 318–323
Davis, L., Jr.: **The origin of cosmic rays,** p. 324–329

Supplement No. 2 to Ser. 10, Vol. 14, 1959

Peters, B.: **Origin of cosmic radiation,** p. 436–456

Supplement No. 2 to Ser. 10, Vol. 15, 1960

Bennett, H. W. and Nash, W. F.: **Model experiments on the design of solid iron magnets for use in cosmic ray spectrographs,** p. 193–201

O'Connor, P. V. and Wolfendale, A. W.: **The characteristics of a solid iron magnet for use in a cosmic ray spectrograph,** p. 202–210

Supplement No. 2 to Ser. 10, Vol. 16, 1960

Stern, D. P.: **Counting rates of wide-aperture cosmic ray counter telescopes,** p. 153–158

Sándor, T.; Somogyi, A. and Telbisz, F.: **Semi-cubical G.M. counter telescope system for underground registration of the meson intensity of the cosmic radiation,** p. 209–214

Stern, D. P.: **Azimuthal asymmetry in high energy interactions,** p. 251–255

Paris Symposium on Radio Astronomy, July 30–Aug. 6, 1958, [Proceedings of the Conference] ed. by Ronald N. Bracewell. Stanford, Calif., Stanford Univ. Press, 1959

Smith, F. G.: **Radio astronomy and the solar system,** p. 3–7
Evans, J. V.; Evans, S. and Thomson, J. H.: **Rapid fading of moon echoes at 100 Mc/s,** p. 8–12
Hey, J. S. and Hughes, V. A.: **Radar observations of the moon at 10-cm wavelength,** p. 13–18
Yaplee, B. S.; Roman, Nancy G.; Craig, K. J. and Scanlon, T. F.: **A lunar radar study at 10-cm wavelength,** p. 19–28
Senior, T. B. A. and Siegel, K. M.: **Radar reflection characteristics of the moon,** p. 29–46
Elsmore, B.: **Radio observations of the lunar atmosphere,** p. 47–49
Gibson, J. E. and McEwan, R. J.: **Observations of Venus at 8.6-mm wavelength,** p. 50–52
Smith, Harlan J. and Douglas, J. N.: **Observations of planetary nonthermal radiation,** p. 53–55
Whitfield, G. R. and Högbom, J.: **Radio observations of the comet Arend-Roland,** p. 56–57

Link, Frantisek: **Sur les ionosphères planétaires,** [Planetary ionospheres], p. 58–60

McClain, E. F. and Sloanaker, R. M.: **Preliminary observations at 10-cm wavelength using the NRL 84-foot radio telescope,** p. 61–68

Alsop, L. E.; Giordmaine, J. A.; Mayer, C. H. and Townes, C. H.: **Observations of discrete sources at 3-cm wavelength using a maser,** p. 69–74

Lovell, A. C. B.: **Moon and planets: concluding lecture,** p. 75–78

Denisse, J. F.: **Les sources d'emissions radioelectriques du soleil,** [The sources of radioelectric emissions of the sun], p. 81–88

de Jager, C.: **The structure of the chromosphere and the low corona,** p. 89–97

Athay, R. G.: **A model of the chromosphere from radio and optical data,** p. 98–104

Panovkin, B. N.: **A model of the inner corona based on radio data,** p. 105–106

Firor, J.: **The quiet sun at 88-cm wavelength,** p. 107

Christiansen, W. N. and Mathewson, D. S.: **The origin of the slowly varying component,** p. 108–117

Waldmeier, M.: **A comparison between radioheliograms and optical observations of the solar corona,** p. 118–122

Gutmann, Monique and Steinberg, J. L.: **Résultats préliminaires obtenus avec l'Interferomètre a 8 antennes sur 3 cm de longueur d'onde,** [Preliminary results with an 8 antennae interferometer on 3-cm wave length], p. 123–124

Gelfreich, G.; Korol'kov, D.; Rishkov, N. and Soboleva, N. S.: **On the regions over sunspots as studied by polarization observations on centimeter wavelengths,** p. 125–128

Vitkevich, V. V.; Kuz'min, A. D.; Salomonovich, A. E. and Udal'tsov, V. A.: **Radio picture of the sun at 3.2-cm wavelength,** p. 129–135

Firor, J.: **Solar radio bright spots at 88-cm wavelength,** p. 136–139

Boischot, A. and Simon, P.: **La composante lentement variable du rayonnement solaire sur 169 Mc/s,** [Variable slow component of the sun's radiation on 169 Mc/s], p. 140–142

Vauquois, B.: **Etude statistique de la composante lentement variable d'après les observations entre 10,000 et 600 Mc/s,** [Statistical study of the variable slow component according to observations between 10,000 and 600 Mc/s], p. 143–148

Newkirk, G., Jr.: **A model of the electron corona with reference to radio observations,** p. 149–158

Covington, A. E.: **Solar emission at 10-cm wavelength,** p. 159–165

Khaĭkin, S. E. and Kaidanovskiĭ, N. L.: **A new radio telescope of high resolving power,** p. 166–170

Ikhsanova, V.: **Solar observations with the large Pulkovo radio telescope at 3.2-cm wavelength,** p. 171–173

Molchanov, A. P.; Chen, Fan-Yun; Wang, Shou-Kuang et al.: **Preliminary results of radio astronomical observations of annular solar eclipse, April 19, 1958,** p. 174–175

Wild, J. P.; Sheridan, K. V. and Trent, G. H.: **The transverse motions of the sources of solar radio bursts,** p. 176–186

Boischot, A.: **Les emissions de type IV,** [Type IV emissions], p. 186–187

Haddock, F. T.: **Some characteristics of dynamic spectra of solar bursts,** p. 188–193

Roberts, J. A.: **Some aspects of type II bursts,** p. 194–200

Giovanelli, R. G. and Roberts, J. A.: **Optical observations of solar disturbances causing type II radio bursts,** p. 201–202

Warwick, Constance and Warwick, J. W.: **Flare-associated bursts at 18 Mc/s,** p. 203–207

Fleischer, R.: **Variations in 18-Mc/s solar and cosmic noise,** p. 208–209

Thompson, A. R.: **The correlation of solar radio bursts with magnetic activity and cosmic rays,** p. 210–213

Giovanelli, R. G.: **Flare puffs as a cause of type III radio bursts,** p. 214

Tanaka, H. and Kakinuma, T.: **Polarization of bursts of solar radio emission at microwave frequencies,** p. 215–217

Gelfreich, G. B.; Ikhsanova, V. N.; Kaĭdanovskiĭ, N. L. et al.: **Bursts of microwave radio emission associated with solar flare,** p. 218–221

Kundu, M. R.: **Etude interférométrique des sources d'activité solaire sur 3 cm de longueur d'onde,** [Interferometric study of sources of solar activity on 3-cm wave length], p. 222–236

Denisse, J. F.: **Rélation entre les émissions de rayons cosmiques solaires et certains sursauts radioéléctriques,** [Relation between solar cosmic ray emissions and certain radioelectric bursts], p. 237–239

Avignon, Yvette; Boischot, A. and Simon, P.: **Observation interférométrique à 169 Mc/s des centres R, sources des orages de bruit,** [Interferometric observation at 169 Mc/s from R centers, source of noise storms], p. 240–244

de Groot, T.: **Spectra of short-lived transients in solar noise at 400 Mc/s,** p. 245–247

Elgarøy, O.: **Frequency drift and fine structure of 200-Mc/s solar bursts,** p. 248–250

Högbom, J. A.: **The instantaneous position and diameter of short duration bursts of solar radi emission**, p. 251

Cohen, M. H. and Fokker, A. D.: **Some remarks on the polarization of 200-Mc/s solar radio emission**, p. 252–258

Alekseev, U. and Vitkevich, V. V.: **On the polarization of solar radio emission at 1.5-m wavelength**, p. 259–262

Boischot, A. and Fokker, A. D.: **The 1957 November 4 event**, p. 263–267

Hewish, A.: **The scattering of radio waves in the solar corona**, p. 268–273

Link, Frantisek: **Manifestations possibles de la couronne de Chapman dans la radio-astronomie** [Possible manifestations of the Chapman corona in radio astronomy], p. 274

Vitkevich, V. V.: **New data on the solar supercorona**, p. 275–281

Blum, E. J. and Boischot, A.: **Eclipse de la nebuleuse du Crabe par la couronne solaire,** [Eclipse of the Crab nebula by the solar corona], p. 282–285

Minnaert, M. G. J.: **The sun: concluding lecture**, p. 286–292

Hey, J. S.: **The first discovery of point sources**, p. 295–296

Whitfield, G. R.: **The spectra of radio sources**, p. 297–304

Kuz'min, A. D. and Udal'tsov, V. A.: **Polarization of 10-cm radiation of the Crab nebula**, p. 305–308

Jennison, R. C.: **The structure of the Cassiopeia A and Cygnus A radio sources measured at 127 Mc/s and 3000 Mc/s**, p. 309–314

Minkowski, R.: **Optical observations of nonthermal galactic radio sources**, p. 315–322

Burbidge, E. Margaret and Burbidge, G. R.: **The radio source in the Cygnus loop and IC443**, p. 323–327

Shain, C. A.: **Observations of extragalactic radio emission**, p. 328–336

Elsmore, B.: **The accurate positions of 17 intense radio sources**, p. 337–338

Drake, F. D.: **The nature of the radio source Cygnus X**, p. 339–346

Baldwin, J. E. and Shakeshaft, J. R.: **Radio emission from the direction of the supergalaxy**, p. 347–351

Adgie, R. L.: **An attempt to detect the 327-Mc/s line of galactic deuterium**, p. 352–354

Davies, R. D.: **Substructure within galactic spiral arms as derived from studies at 21 cm**, p. 355–359

Muller, C. A.: **21-cm hydrogen-line absorption in the spectra of discrete sources**, p. 360–365

Drake, F. D.: **Neutral hydrogen in galactic clusters**, p. 366–369

Van Woerden, H.: **The distribution of neutral hydrogen in the Orion region**, p. 370–373

Burke, B. F.; Ecklund, E. T.; Firor, J. W. et al.: **Atomic hydrogen survey near the galactic plane**, p. 374–389

Erickson, W. C.; Helfer, H. L. and Tatel, H. E.: **A survey of neutral hydrogen at high galactic latitudes**, p. 390–397

van de Hulst, H. C.: **Galactic and extragalactic radio sources: concluding lecture**, p. 398 401

Pawsey, J. L.: **Radio evidence on the large-scale structure of our own and external galaxies**, p. 405–408

Oort, J. H.: **A summary and assessment of current 21-cm results concerning spiral and disk structures in our galaxy**, p. 409–415

Rougoor, G. W. and Oort, J. H.: **Neutral hydrogen in the central part of the galactic system**, p. 416–422

Volders, Louise and van de Hulst, H. C.: **Neutral hydrogen in extragalactic systems**, p. 423–430

Mills, B. Y.: **Galactic structure at meter wavelengths**, p. 431–446

Westerhout, G.: **75-cm and 22-cm continuum surveys**, p. 447–450

Shain, C. A.: **Absorption of 19.7-Mc/s in H II regions**, p. 451–459

Baldwin, J. E.: **Galactic background surveys and the galactic halo**, p. 460–464

Muller, C. A.: **Hydrogen-line observations on the coma cluster**, p. 465

Blaauw, A.: **The large-scale structure of galaxies: concluding lecture**, p. 466–468

Brown, R. Hanbury: **The distribution and identification of the sources**, p. 471–474

Ryle, M.: **The problem of confusion in surveys of sources**, p. 475–476

Hazard, C. and Walsh, D.: **A comparison of an interferometer and total-power survey of discrete sources of radio-frequency radiation**, p. 477–486

Archer, S.; Baldwin, J. E.; Edge, D. O. et al.: **Studies of radio sources at 159 Mc/s**, p. 487–491

Boischot, A.: **Résultats préliminaires de l'observation des radiosources à l'aide de l'interféromètre de Nançay**, [Preliminary results of the observation of radio sources using the Nançay interferometer], p. 492–495

Sanamian, V. A. and Tovmasian, H. M.: **On increase of the sensitivity and directivity of radio interferometers**, p. 496–497

Mills, B. Y.: **A survey of radio sources at 3.5-m wavelength**, p. 498–506

Dewhirst, D. W.: **The optical identification of radio sources,** p. 507–513
Basinski, Jane; Bok, B. J. and Gottlieb, K.: **Optical identification of southern radio sources,** p. 514–522
Ryle, M.: **The nature of the radio sources,** p. 523–528
Hoyle, F.: **The relation of radio astronomy to cosmology,** p. 529–532
McVittie, G. C.: **Remarks on cosmology,** p. 533–535
Minkowski, R.: **Discrete sources and the universe: concluding lecture,** p. 536–538
Burbidge, G. R.: **The theoretical explanation of radio emission,** p. 541–551
Schatzman, E.: **On the possibility of observing radio emission from flare stars,** p. 552–553
Hartz, T. R.: **Radio noise measurements on the passage of solar particles through the corona,** p. 554–561
Takakura, T.: **Synchrotron radiation and solar radio outbursts at microwave frequencies,** p. 562–570
Tunmer, Harriet: **The origin of the belt of galactic radio waves,** p. 571–573
Ginzburg, V. L.: **On the mechanisms of sporadic solar radio emission,** p. 574–582
Gold, T.: **Cosmic rays and radio waves as manifestations of a hot universe,** p. 583–588
Ginzburg, V. L.: **Radio astronomy and the origin of cosmic rays,** p. 589–594
Wallis, G.: **The determination of the energy distribution of relativistic electrons by the frequency distribution of their "synchrotron radiation,"** p. 595–597
Hoyle, F.: **Mechanisms of solar and cosmic emission: concluding lecture,** p. 598–601

Records of Oceanographic Works in Japan, Tokyo, Special No. 4, March 1960

Nakamura, Akikazu: **A study on the productivity of Tanabe Bay; tidal currents in Tanabe Bay, Pt. 3,** p. 1–11
Fuse, Shin-ichiro and Harada, Eiji: **A study on the productivity of Tanabe Bay, Pt. 3, Oceanographic conditions of Tanabe Bay (3), Result of the survey in the summer of 1958,** p. 13–28
Fukuo, Yoshiaki: **On the exchange of water and the productivity of a bay with special reference to Tanabe Bay, Pt. 3,** p. 29–38
Takenouti, Yositada and Yasui, Masasi: **On the short period variations of oceanographical conditions in the Kuroshio region (Preliminary Report),** p. 55–57
Uda, Michitaka and Ishino, Makoto: **Researches on the currents of Kuroshio,** p. 59–72
Niino, Hiroshi: **Study on the natural radioactivity of bottom deposits, Pt. 2,** p. 165–170
Hatai, Kotora; Hayasaka, Shozo and Iwai, Takehiko: **Evidence for recent changes in sea-level of the Atsumi Peninsula, Atsumi-gun, Aichi Prefecture,** p. 171–177
Hatai, Kotora; Hayasaka, Shozo and Iwai, Takehiko: **Ground water and related phenomena observed along the southern coast of Atsumi Peninsula, Aichi Prefecture,** p. 179–185
Sasaki, Tadayoshi; Watanabe, Seiichi; Oshiba, Gohachiro et al: **Measurements of perpendicular and horizontal angular distributions of submarine daylight by means of a new remote control instrument,** p. 197–205

Royal Meteorological Society, Quarterly Journal, Vol. 86, No. 370, Oct. 1960

Fjørtoft, R.: **On the control of kinetic energy of the atmosphere by external heat sources and surface friction,** p. 437–453
Singleton, F. and Smith, D. J.: **Some observations of drop-size distributions in low layer clouds,** p. 454–467
Atlas, D.; Harper, W. G.; Ludlam, F. H. and Macklin, W. C.: **Radar scatter by large hail,** p. 468–482
Ball, F. K.: **Control of inversion height by surface heating,** p. 483–494
Panofsky, H. A. and McCormick, R. A.: **The spectrum of vertical velocity near the surface,** p. 495–503
Knighting, E. and Hinds, Mavis K.: **A report on some experiments in numerical prediction using a stream function,** p. 504–511
Mateer, C. L. and Godson, W. L.: **The vertical distribution of atmospheric ozone over Canadian stations from *umkehr* observations,** p. 512–518
Walshaw, C. D.: **The accuracy of determination of the vertical distribution of atmospheric ozone from emission spectrophotometry in the 1,043 cm^{-1} band at high resolution,** p. 519–529
Ramsay, M. W. and Chalmers, J. Alan: **Measurements on the electricity of precipitation,** p. 530–539

Ebdon, R. A.: **Notes on the wind flow at 50 mb in tropical and sub-tropical regions in January 1957 and January 1958,** p. 540–542

Durst, C. S.: **The statistical variation of wind with distance,** p. 543–549

Oddie, B. C. V.: **The variation in composition of sea-salt nuclei with mode of formation,** p. 549–551

Mason, B. J.: **Ice-nucleating properties of clay minerals and stony meteorites,** p. 552–556

Barry, R. G.: **A note on the synoptic climatology of Labrador-Ungava,** p. 557–565

Longley, Richmond W.: **[Comment on] C. I. Jackson: Snowfall measurements in northern Canada, and [Reply by] Jackson,** p. 566–567

Baur, F.: **Physical-statistical rules as bases for forecasts of weather and weather-character,** p. 567–568

Veryard, R. G.; Lamb, H. H. and Callendar, G. S.: **[Comments on] E. B. Kraus: Synoptic and dynamic aspects of climatic change,** p. 569–575

Scorer, R. S. et al: **[Comments on] D. W. Martin and A. W. Brewer: A synoptic study of day-to-day changes of ozone over the British Isles,** p. 575–576

Matthewman, A. G. et al: **[Comments on] F. K. Hare: The summer circulation of the arctic stratosphere below 30 km.,** p. 576–578

Sheppard, P. A.: **[Comment on] J. I. P. Jones and F. Pasquill: An experimental system for directly recording statistics of the intensity of atmospheric turbulence, and [Reply by] Pasquill,** p. 578–579

Hare, F. K. and Sawyer, J. S.: **[Comment on] J. L. Monteith: The reflection of short-wave radiation by vegetation, and [Reply by] Monteith,** p. 579

Solar Energy: the Journal of Solar Energy Science and Engineering, Phoenix, Vol. 4, No. 1, Jan. 1960

Fritz, S.: **Some solar radiation data presentations for use in applied solar energy programs by an international group of authors,** p. 1

de Barry, E.: **Examples of statistical representation of radiation data,** p. 2–7

Hinzpeter, Hans: **Frequency distribution of hourly sums of direct solar radiation at Potsdam,** p. 8–13

Kondrat'ev, K. Ia. and Manolova, M. P.: **The radiation balance of slopes,** p. 14–19

Fritz, S. and MacDonald, T. H.: **The number of days with solar radiation above or below specific values,** p. 20–22

Gardner, Grandison: **Quantity of heat energy received from the sun,** p. 26–28

Gardner, Grandison: **Two atmospheres,** p. 28–31

Zahl, Harold A. and Ziegler, Hans K.: **Power sources for satellites and space vehicles,** p. 32–38

Kapur, J. C.: **A report on the utilization of solar energy for refrigeration and air conditioning applications,** p. 39–47

El Sabban, A. F. and Elnesr, M. K.: **A note on the solar radiation pattern for the United Arab Republic,** p. 48

Zeitschrift für Astrophysik, Berlin, Vol. 47, No. 2, 1959

Hachenberg, O. and Volland, H.: **Vergleich zwischen 3.2 cm-Radiostrahlung der Sonne und ionosphärischer Dämpfung im D-Gebiet während einer Sonneneruption,** [Comparison between the 3.2 cm radio burst of the sun and the ionospheric damping in D layer during solar eruption], p. 69–80

Chandra, Suresh and Srivastava, B. P.: **Absorption of microwaves in planetary atmospheres,** p. 127–134

Vol. 47, No. 3, 1959

Voigt, H. H.: **"Drei-Strom-Modell" der Sonnenphotosphäre, Pt. 2, Die infraroten Nickellinien λ7789 und 7798 A,** [Three stream model of sun's photosphere, Pt. 2, The infrared nickel lines λ7789 and 7798 A], p. 114–160

Oster, Ludwig: **Der kontinuierliche Absorptionskoeffizient für Frei-Frei-Strahlung im radiofrequenten Spektralgebiet,** [The continuous absorption coefficient for free-free-emission in the radio frequency spectrum], p. 169–190

Bruzek, Anton: **Über die Spiculen auf der Sonnenscheibe,** [Chromospheric spicules], p. 191–197

Vol. 47, No. 4, 1959

Stumpff, P.: **Die Bewegung der Materie im Schweif des Kometen Morehouse am 29. Oktober 1908,** [The motion of material in the tail of the Morehouse Comet, Oct. 29, 1908], p. 225–265

Vol. 48, No. 1, 1959

Deubner, Franz-Ludwig: **Über die Verminderung des Streulichts in Abbildungssystemen,** [Reduction of scattered light in reproductive equipment], p. 34–38

Mezger, P. G. and Strassl, H.: **Die thermische Radiostrahlung des Mondes bei 1420 MHz,** [Thermal radio emission of the moon at 1420 MHz], p. 72–76

Vol. 48, No. 2, 1959

Becker, U.: **Über eine sekundäre Fleckenzone,** [Secondary spot area], p. 88–94

Vol. 48, No. 3, 1959

Biermann, L.; Kippenhahn, R., Lüst, R. et al.: **Beiträge zur Theorie der Sonnengranulation,** [Theory of solar granulation], p. 172–188

Becker, U.: **Die Beobachtung von Surges, Filamenten und chromosphärischen Strukturen im Integrallicht,** [Observation of surges, filaments and chromospheric structures in white light], p. 189–202

Elsässer, H. and Siedentopf, H.: **Zur Theorie der astronomischen Szintillation. I,** [Theory of astronomical scintillation, Pt. 1], p. 213–230

Vol. 48, No. 4, 1959

Böhm, K. H. and Richter, E.: **Der einfluss des Strahlungsaustausches auf die Konvektion in einer polytropen Astmosphäre,** [Effects of radiation change on the convection in a polytropic atmosphere], p. 231–248

Kiepenheuer, K. O.: **Über die Verdichtung der Koronamaterie,** [Increase of coronal material,] p. 290–297

Vol. 49, No. 2, 1960

Kiepenheuer, K. O.: **Über die Struktur der gestörten Sonnenatmosphäre,** [Structure of the disturbed solar atmosphere], p. 73–94

Rabben, H. H.: **Solare Bursts der Type III und ihre Beziehungen zu den Eruptionen,** [Type III solar bursts and their relation to eruptions], p. 95–110

Vol. 49, No. 3, 1960

Waldmeier, M.: **Bewegungen in Sonnenprotuberanzen, IV, Die aufsteigende Protuberanz vom 11. April 1959,** [Motions in solar prominences, Pt. 4, The ascending prominence of April 11, 1959], p. 153–160

Mayer, Ursula: **Beobachtungen der Richtungsszintillation,** [Observations of image excursion], p. 161–167

Waldmeier, M.: **Zirkulation und Magnetfeld der solaren Polarzone,** [Circulation and magnetic field of the sun's polar region], p. 176–185

Haupt, H. and Ellerböck, W.: **Der Protuberanzenaufstieg vom 11. April 1959, I, Beschreibung des Aufstiegs,** [The ascending prominence of April 11, 1959, Pt. 1, Description of the ascent], p. 192–197

Vol. 49, No. 4, 1960

Hoffmeister, C.: **Interplanetare Materie und Verstärke Nachthimmelleuchten** [Interplanetary matter and the increased nightglow], p. 233–242

Vol. 50, No. 1, 1960

Waldmeier, M.: **Form und Ausdehnung der monochromatischen Korona,** [Form and area of the monochromatic corona], p. 35–47

Unsöld, Albrecht: **Über die Temperatur der Sonnenkorona,** [Temperature of the solar corona], p. 48–56

Unsöld, Albrecht: **Aufbau und Variationen der Sonnenkorona,** [Structure and variations of the solar corona], p. 57–68

Böhm, Karl-Heinz and Böhm-Vitense, Erika: **Zur Interpretation des Intensitätsabfalls am äussersten Sonnenrand,** [Interpretation of the intensity drop at the outer edge of the sun], p. 69–72

Vol. 50, No. 2, 1960

Böhm, K. H. and Richter, E.: **Konvektion in einer Atmosphäre mit tiefenabhängigem Temperaturgradienten und starker Dichtevariation,** [Convection in an atmosphere with a depth-dependent temperature gradient and strong density variations], p. 79–95

Bruzek, A.: **Beobachtungen über die Beziehungen zwischen Eruptionen und Fleckenfeldern,** [Observations on the relation between eruptions and sunspot fields], p. 110–120

Vol. 50, No. 3, 1960

Waldmeier, M.: **Das Verhalten der monochromatischen Korona im 11 jährigen Zyklus,** [Behavior of the monochromatic corona in the 11-year cycle], p. 145–154

Vol. 50, No. 4, 1960

Waldmeier, M.: **Die Struktur der aktiven Chromosphäre,** [Structure of the active chromosphere], p. 225–232

Cayrel, R. and Traving, G.: **Zur Frage der Druckverbreiterung der solaren Balmerlinien,** [Pressure broadening of the solar Balmer lines], p. 239–252

Singh, R. P. and Goel, N. S.: **The physical state of condensed matter and the radius of a cold planetary body,** p. 269–277

Elsässer, H.: **Zur Theorie der astronomischen Szintillation, II,** [Theory of stellar scintillation, Pt. 2], p. 278–295

PART IV. AUTHOR AND SUBJECT INDEXES

In this section will be found references to the number given at the head of each abstract or entry. In Part I each entry begins with the number 12.1 and in Part II in the Bibliography on Auroras each entry begins with the number and letter 12A. This index is divided into three parts:

Index of Authors

Index of Subjects

Index of Geographical Locations

INDEX OF AUTHORS

Aarons, A., 12.1–189
Aarons, J., 12A–1
Abbott, C. G., 12.1–118
Abramov, R. V., 12A–3
Ackermann, P., 12.1–81
Adamov, P. N., 12.1–28
Adem, J., 12A–4
Aelion, E., 12.1–254
Agy, V., 12A–5
Aĭzenberg, M. M., 12.1–199
Akademiia Nauk SSSR, 12.1–3, 12.1–17, 12.1–19, 12A–107
Akasofu, Syun-ichi, 12.1–146, 12A–6
Alaska Univ. Geophysics Institute, 12A–49, 12A–57, 12A–180, 12A–132, 12A–168, 12A–202
Albert, E. G., 12.1–286
Almeida, I. G., 12.1–385
Alt, J., 12.1–47
American Geophysical Union, 12.1–17
Anderson, E. C., 12.1–84, 12.1–189
Anderson, K. A., 12A–7
Anderson, R. L., 12.1–261
Angell, J. K., 12.1–234
Anghel, V., 12.1–211
Antal, E., 12.1–369
Argentina Servicio de Hidrografia Naval, 12.1–25
Arkhangel'skiĭ, B. F., 12A–8
Armstrong, E. B., 12A–9, 12A–10
Arnold, A., 12.1–249
Arnold, J. R., 12.1–77
Arnold, R. D., 12.1–15
Ashburn, E. V., 12A–11, 12A–12, 12A–13, 12A–14, 12A–204
Askhaev, M. G., 12.1–29
Astoin, N., 12.1–108
Aubert, C., 12.1–303
Austria Zentralanstalt für Meteorologie und Geodynamik, 12.1–401, 12.1–402
Ayer, H. S., 12.1–336
Bagariatskiĭ, B. A., 12A–19, 12A–20, 12A–21
Bailey, R. E., 12.1–5
Baines, H., 12A–22
Balescu, O. I., 12.1–64
Ballantyne, J., 12A–111
Banal, M., 12.1–176
Banerji, A. K., 12.1–342
Barbier, D., 12A–23, 12A–24
Barbier, M. G., 12.1–86
Barla, M., 12.1–258
Barlow, E. W., 12.1–160, 12A–25
Bartels, J., 12A–47
Batchelor, G. K. (ed.), 12.1–1
Baud. R., 12.1–98
Baumbärtner, H., 12.1–74
Belgium Institut Royal Météorologique, 12.1–227
Benditskiĭ, N. D., 12A–26
Bendix Aviation Corporation, 12.1–46
Benson, R. F., 12A–27
Berg, M. R., 12A–129, 12A–210
Bergsten, F., 12.1–174
Bershchanskiĭ, Iu. I., 12.1–260
Bhattacharyya, B. K., 12A–28
Biermann, L. F., 12.1–133
Biggers, W. R., 12.1–5
Bird, L. E., 12A–113
Birfel'd, Ia. G., 12A–29
Bjerknes, J., 12.1–403
Bless, R. C., 12A–30
Bodea, F., 12.1–240
Boithias, L., 12.1–99
Bolin, B., 12.1–272
Booker, H. G., 12A–31
Borisov, A. A., 12.1–35
Bormann, G., 12.1–170
Bostwick, W. E., 12A–163
Botley, Cicely M., 12A–32
Botsch, F. W., 12.1–92
Bowles, K. L., 12A–33
Breitkreutz, E., 12A–199
Breslow, L., 12.1–71
Bristow, G. C., 12.1–37
Brode, W. R., 12.1–15
Brook, M., 12.1–431, 12.1–432,
Broussaud, G., 12.1–98
Brovikov, I. S., 12.1–177
Brown, J. A., 12.1–288
Brown, R. H., 12A–34
Bruner, E. C., Jr., 12A–198
Buchinskiĭ, I. E., 12.1–36
Buckland, W. R. (ed.), 12.1–18
Bucsy, J., 12.1–357
Buffault, L., 12.1–97
Buiniskiĭ, V. K., 12A–35
Bullough, K., 12A–116
Bultot, F., 12.1–200
Buriev, V. N., 12.1–333
Burkhart, K., 12A–36
Burstall, T., 12A–128
Businger, J. A., 12.1–408

Cagniard, L., 12.1–218
Campbell, W. H., 12A–37, 12A–38
Canada Meteorological Branch, 12.1–14
Carreras-Patxot, R., 12.1–264
Carzan, C., 12.1–103
Castillo, P., 12A–40
Cehak, K., 12.1–250
Chamberlain, J. W., 12A–48, 12A–160
Chapman, S., 12A–41, 12A–42, 12A–43, 12A–44, 12A–45, 12A–46, 12A–47
Charney, Jule, 12.1–299
Chauveau, J., 12.1–161
Chen, Shou-jun, 12.1–339
Cheng, Kenneth T. C., 12.1–20
Chepil, W. S., 12.1–243
Chernyshev, V. I., 12.1–12
Chicago Univ. Yerkes Observatory, 12A–48, 12A–160
Chiue, C-j., 12.1–388
Christiansen, W. N., 12.1–135
Chubb, T. A., 12.1–116
Clark, K. C., 12A–49
Clough, H. W., 12.1–119
Collins, C., 12A–50
Columbia University Lamont Geological Observatory,
Condon, E. U., 12.1–15

Conference on Atmospheric Electricity, 2nd, Portsmouth New Hampshire, 12.1–2
Conrad, V., 12.1–158
Contract 61 (514)-963, 12.1–252
Contract AF 19(122)-152, 12A–115, 12A–209, 12A–220
Contract AF 19(122)-441, 12.1–159
Contract AF 19(122)-478, 12A–195
Contract AF 19(122)-480, 12A–48, 12A–160
Contract AF 19(604)-1089, 12A–132
Contract AF 19(604)-1738, 12.1–289
Contract AF 19(604)-1755, 12.1–286
Contract AF 19(604)-1843, 12.1–139
Contract AF 19(604)-1859, 12A–168
Contract AF 19(604)-3880, 12A–202
Contract AF 19(604)-2242, 12.1–368
Contract AF 19(604)-3877, 12.1–271
Contract AF 33(600)-37984, 12.1–46
Contract AF 61(514)-628, 12.1–130
Contract AF 61(514)-628-C, 12.1–131
Contract AF 64(500)-1, 12A–78, 12A–144, 12A–145, 12A–146
Contract AF 64(500)-4, 12A–237
Contract CWB-8683, 12.1–301
Contract CWB 9241, 12.1–383
Contract CWB-9395, 12.1–301
Contract DA-36-039-sc-56739, 12A–180
Contract DA-36-039-sc-78185, 12.1–88
Contract IA-454, 12A–5
Contract NONR-1600(00), 12.1–417
Contract R-65-8-99812 Sc-04-91, 12.1–346
Costa, N. L., 12.1–385
Crombie, A. C., 12.1–38
Cuillé, J., 12.1–247
Cullington, A. L., 12A–51
Currie, B. W., 12A–52, 12A–53, 12A–54, 12A–55, 12A–56, 12A–121, 12A–140, 12A–141,

DA task 3-99-07-302, 12.1–249
Daisley, R. E. (transl.), 12A–20
Daubert, K., 12.1–70
Davies, J. G., 12.1–223
Davis, T. N., 12A–57
Defay, R., 12.1–373
Defant, F., 12.1–252, 12.1–295, 12.1–296
Defrise, P., 12.1–294
de Haan, H., 12.1–52
Denton, D., 12.1–75
de Panfilis, M., 12.1–166
De Percin, F., 12.1–321, 12.1–395
Derblom, H., 12A–233
Descartes, R., 12.1–38
D'Hauteserre, M. A., 12.1–397
Dockes, J., 12.1–102
Dolezal, E., 12.1–404
Dolphin, L. T., 12A–210
Donn, W. L., 12.1–351
Dorey, D. B., 12.1–89
Douglas, C. K. M., 12.1–380
Dourgnon, J., 12.1–313
Dow, W. G., 12.1–139
Doyen, Paulette, 12.1–399
Drawin, H. W., 12.1–242
Dremliug, V. V., 12.1–196
Drogaĭtsev, D. A., 12.1–354
Droste, Zofia, 12.1–167
Dryden, H. L., 12.1–150
Dubrovskaia, F. I., 12.1–277
du Castel, F., 12.1–99, 12.1–101
Dufay, J., 12A–58, 12A–59
Dufay, M., 12A–60
Dufour, L., 12.1–373
Duncan, D. P., 12.1–388
Dyce, R. B., 12A–61, 12A–129, 12A–210
Dzhordzhio, N. V., 12A–62

Efremov, A., 12A–35
Egeland, A., 12A–1, 12A–63
Egorov, A. G., 12.1–29
Egyed, L., 12.1–171
Ellyett, C. D., 12A–215
Elvey, C. T., 12A–64, 12A–65, 12A–66, 12A–67
Emon, J., 12.1–310
Enemark, D. C., 12A–7
Enescu, G., 12.1–208
Erikssen, E., 12.1–272
Eulitz, G., 12.1–79
Ewing, M., 12.1–159, 12.1–189

Falkowski, S. J., 12.1–395
Fan, C. Y., 12A–48
Fanselau, G., 12.1–148, 12.1–149
Farnsworth, Alice H., 12A–64
Faure, H., 12.1–215
Fedorov, K. N., 12.1–352
Fedorova, N. I., 12A–19
Fedorovich, B. A., 12A–69
Fedoseev, A. P., 12.1–59
Fehrenbach, Ch., 12.1–132
Feibelman, W. A., 12A–70, 12A–71
Fel'dshteĭn, Ia. I., 12A–72
Fenton, K. B., 12A–181
Ferraro, V. C. A., 12A–73
Fesko, K. Ia., 12.1–56
Fischer, H. J., 12.1–429
Fischer, P. L., 12.1–410
Florida State Univ. (Tallahasse) Dept. of Meteorology, 12.1–301, 12.1–417
Flowers, E. C., 12.1–22
Foldvik, A., 12.1–363
Förchtgott, J., 12.1–334, 12.1–382
Ford Instrument Co., 12.1–88
Forsyth, P. A., 12.1–128, 12.1–129, 12A–74, 12A–75, 12A–76
Fouchet, J., 12.1–72
Fourmarier, P., 12.1–10
Fournier d'Albe, E. M., 12.1–265
Fowler, P. H., 12A–77
Frank, N. L., 12.1–301
Frankpitt, B. L., 12A–78, 12A–145, 12A–146, 12A–237
Fraysse, M., 12.1–48
Fricker, S. J., 12A–79
Fraysse, M., 12.1–48
Fricker, S. J., 12A–79
Froelich, R., 12.1–388
Fujita, Tetsuya, 12.1–305
Fuks, N. A., 12.1–11
Funke, P. W., 12.1–5

Gadomski, J., 12.1–110
Gadsden, M., 12.1–425, 12A–80, 12A–238
Gal'perin, Iu. I., 12A–81, 12A–82
Gartlein, C. W., 12A–30, 12A–31, 12A–46, 12A–48, 12A–83, 12A–84, 12A–85, 12A–86
Gaul, R. D., 12.1–186
Gentilli, J., 12.1–8
Geofisica e Meteorologia, 12.1–91
Geophysical Research in Norway, 12A–87
George, J. J., 12.1–5
Georgii, W., 12.1–6
Gerson, N. C., 12A–88, 12A–89
Gherzi, E., 12.1–428
Gigout, M., 12.1–212
Gil'denskio'ld, R. S., 12.1–273
Glasgal, R., 12A–48
Gleissberg, W., 12A–90
Goddard, S. C., 12A–22
Goroshnikov, E. A., 12.1–33
Graham, H. E., 12.1–302
Grau, G., 12.1–161
Green, F. D., 12A–76

Greenhow, J. S., 12A–91
Griffiths, J. F., 12.1–389, 12.1–413
Grinda, L., 12.1–169
Guild, W. G., 12.1–387
Guruswamy, S., 12.1–278
Gush, H., 12A–114
Gustafson, P. F., 12.1–85
Gustafsson, G., 12A–1
Guyot, H., 12.1–247

Haber, H., 12.1–151
Hadni, A., 12.1–315
Hakura, Yukio, 12A–92
Hale, D. P., 12A–48
Haley, A. G., 12.1–156
Hantke, R., 12.1–214
Hanzawa, Masao, 12.1 175, 12.1–353
Harang, L., 12A–93, 12A–94
Hartz, T. R., 12A–95, 12A–96, 12A–97
Haser, L., 12.1–130, 12.1–131, 12.1–132
Hatakeyama, H., 12.1–266
Haurwitz, B., 12.1–182, 12.1–289
Hatherton, T., 12A–98, 12A–99
Hawkins, G. S., 12A–100
Haymes, R. C., 12A–123
Heim de Balzac, H., 12.1–274
Heinitz, K., 12.1–163
Helliwell, N. C., 12.1–290
Helliwell, R. A., 12A–151
Hennessey, J. J., 12.1–143
Heppner, J. P., 12A–101
Hessler, Joan, 12A–65
Ho, P. Y., 12A–212
Hodder, B. W., 12.1–396
Hodson, A. C., 12.1–388
Hok, G., 12.1–139
Hope, E. R. (transl.), 12A–19
Horner, G. M., 12.1–201
Howell, W. E., 12.1–267
Hrubeš, P., 12.1–41
Hsu, Pao chin, 12.1–287
Hubbard, H. H., 12.1–438
Huguet, F., 12.1–86
Hulburt, E. O., 12.1–291
Hultqvist, B., 12A–63
Hunten, D. M., 12A–102, 12A–209, 12A–221
Hunter, W., 12.1–281

Iakovleva, A. V., 12.1–314
Ichiye, Takashi, 12.1–184, 12.1–187
Iliopoulos, P. J., 12.1–13
Ingalls, R. P., 12A–79, 12A–113
Ingard, U., 12.1–15
Inglis, G. A., 12.1–422
Institute of Radio Engineers, 12A–103
Institution of Electrical Engineers, 12A–105
International Geophysical Year, 12A–104
International Institute of Meteorology, Univ. of Stockholm, 12.1–252
International Journal of Abstracts, 12.1–18
International Scientific Radio Union, 12A–252
International Statistical Institute, Netherlands, 12.1–18
International Union of Geodesy and Geophysics, 12.1–217
I.U.G.G. Association of Geodesy, 12A–252
Iudin, M. I., 12.1–338
Isaev, S. I., 12A–108, 12A–109
Israel. Meteorological Service, 12.1–228, 12.1–229
Iudin, Iu. L., 12A–110
Ivanov, I. D. (tr.), 12.1–189
Ivanova, Z. S., 12.1–183
Izawa, T., 12.1–257

Jacka, F., 12A–111
Jackson, J. E., 12A–112
Jaeger, J. C., 12.1–125
James, J. C., 12A–113
Jancel, R., 12.1–136
Janot, C., 12.1–315
Jardetsky, W. S. (ed.), 12.1–17
Jefferson, G. J., 12.1–263
Jindo, Hidehiko, 12.1–113
Jobert, Nelly, 12.1–162
Jolas, P., 12.1–178
Jones, A. V., 12A–114, 12A–115, 12A–209
Jordan, C. L., 12.1–301
Journal of Scientific and Industrial Research, 12A–105

Kachalov, V. P., 12.1–314
Kadambi, V., 12.1–335
Kaganer, M. S., 12.1–199
Kahan, T., 12.1–136
Kaiser, T. R., 12A–116, 12A–117, 12A–118
Kakinuma, Takakiyo, 12.1–113, 12.1–114, 12.1–224
Kalashnikov, A. G. (ed.), 12.1–17
Kalm, P., 12A–119
Kao, S. K., 12.1–236, 12.1–355
Karapiperis, L. N., 12A–120
Kartha, T. D. K., 12.1–192
Kawabata, Kin-aki, 12.1–138
Kawamoto, Takeo, 12.1–190
Kawase, Zirô, 12.1–251
Keay, C. S. L., 12.1–225
Keller, J. E., 12.1–428
Kertz, W., 12.1–145
Kibel', I. A. (ed.), 12.1–3
Kim, J. S., 12A–121
Kimball, D. S., 12A–30, 12A–46, 12A–85
King, E., 12.1–73
Kisho-Shiryo, Nippon, 12A–153
Kitagawa, N., 12.1–431, 12.1–432, 12.1–435
Kitrosser, I., 12.1–247
Knecht, R. W., 12A–122, 12A–252
Koenig, J. D., 12.1–103
Kokoulin, P. P., 12.1–39
Koreicho, W., 12.1–102
Korff, S. A., 12A–123
Kosibowa, Stefania, 12A–124
Kozak, J. J., 12.1–350
Kozik, S. M., 12.1–220
Krasovskiĭ, V. I., 12A–125
Krylov, Iu. M., 12.1–179
Kudo, T., 12.1–268
Kuettner, J., 12.1–358
Kurdina, E. N., 12A–72

Laborde, G., 12.1–112
Lacaze, J., 12.1–306
LaChapelle, E., 12.1–390
Landolt, A. U., 12A–48
Landsberg, H. E., 12.1–34
Lange, R., 12.1–318
Lange-Hesse, G., 12A–126, 12A–127
Lansing, D. L., 12.1–438
Larsen, Esther Louise (transl.), 12A–119
Larsson, L., 12.1–364
Laurens, A., 12.1–103
Lauscher, F., 12.1–419
Lautensach, H., 12.1–398
Lavergne, M., 12.1–161
Lavin, G. I., 12.1–288
Lavrov, V. S., 12.1–61
Law, P. G., 12A–128
Leadabrand, R. L., 12A–129, 12A–189, 12A–210
Lebedinskii, A. I., 12A–130
Lecomte, J., 12.1–247
Lee, O. S., 12.1–194
Leipzig, Universität, 12.1–142
Leningrad Universitet, 12.1–4
Leonard, R. S., 12A–131
Leonov, M. P., 12.1–307
Les Ailes, 12.1–49
Levine, J., 12.1–383
Lewis, W., 12.1–45
Lhermitte, R., 12.1–384
Liebermann, L., 12.1–189
Liège Université. Institut d'Astrophysique, 12.1–130, 12.1–131
Liljequist, G. H., 12.1–26
Lindner, H., 12.1–328
Lippmann, H. S., 12.1–311
List, R., 12.1–393, 12.1–394

Little, C. G., 12A–132
Lockhart, L. B., Jr., 12.1–82
Lönnqvist, O., 12.1–316
Logvinov, K. T., 12.1–27
London Science Museum, 12A–133
Lorch, J., 12.1–62
Lovell, A. C. B., 12.1–223, 12A–34
Lowenthal, M. J., 12.1–249
Lowry, W. P., 12.1–370
Lucke, O., 12.1–148, 12.1–149
Lüst, Rhea, 12.1–133
Lüst-Kulka, R., 12.1–109
Lyon, G. F., 12A–134
Lysak, G. N., 12.1–416

Maazik, E., 12.1–407
McCormick, R. A., 12.1–221, 12.1–345
McEwen, J., 12A–135
Machta, L., 12.1–87
McInnes, B., 12A–136, 12A–137, 12A–184
McKinley, D. W. R., 12A–138
McLaughlin, D. B., 12A–139
McLean, G., 12.1–358
McNamara, A. G., 12A–140, 12A–141, 12A–142, 12A–143
McQuistan, G. W., 12A–78, 12A–144, 12A–145, 12A–146, 12A–237
McRae, J. N., 12.1–233, 12.1–253
Made, A., 12.1–51
Mädlow, Marlene, 12.1–120
Maffei, P., 12A–147
Maglieri, D., 12.1–438
Magono, C., 12.1–436
Mah, W., 12A–76
Mak, A., 12.1–423
Makhotkin, L. G., 12.1–437
Malnar, L., 12.1–98
Malsch, S., 12.1–74
Malurkar, S. L., 12.1–117
Malville, J. M., 12A–148, 12A–149
Malville, M., 12A–48
Mané, K. U., 12.1–232
Manley, G., 12.1–319
Manring, E. R., 12A–150
Marine Observer, 12A–16, 12A–17
Mariners Weather Log, 12.1–37, 12.1–378
Marion, J., 12.1–63
Marovich, E., 12A–197
Marquez, L., 12.1–385
Martell, E. A., 12.1–77
Martin, L. H., 12A–151
Mass. Inst. of Technology, Dept. of Meteorology, 12.1–368
Mason, B. J., 12.1–374
Massey, H. S. W., 12A–152
Mastenbrook, H. J., 12.1–235
Mathewson, D. S., 12.1–135
Matschinski, M., 12.1–216
Matsushita, S., 12A–153, 12A–225
Mawdsley, J., 12A–154
Mayaud, P. N., 12A–155
Mednikova, N. V., 12A–156
Meijer, K. H., 12.1–331
Meinel, A. B., 12A–157, 12A–158, 12A–159, 12A–160, 12A–161
Melloni, M., 12.1–40
Meos, J., 12A–162
Mercure, R., 12.1–152
Merritt, E., 12A–163
Meteorologiia i Gidrologiia, 12.1–43
Metneiks, A. L., 12.1–282
Michard, R., 12.1–112
Michigan Univ. Engineering Research Institute, 12.1–139
Michon, G., 12.1–86
Middleton, Helen K. (ed.), 12.1–197
Midwinter, G. G., 12A–98
Miele, A., 12.1–155
Miller, S. C., Jr., 12.1–152
Millman, P. M., 12A–138, 12A–164
Milosavljević, M., 12.1–347
Mironov, A. V., 12A–165
Misme, P., 12.1–104
Mitchell, K. J., 12.1–60
Mitra, S. N., 12.1–137
Mitropol'skaia, O. N., 12.1–122
Mitterling, P. I., 12.1–23
Mörikofer, W., 12.1–238
Montalbetti, R., 12A–135
Montgomery, R. B., 12.1–181
Moore, J. G., 12A–14, 12A–198
Moorman, T. S., 12.1–94
Mühleisen, R., 12.1–429
Muliarchik, T. M., 12A–166
Mulky, G. R., 12.1–342
Munk, W. H., 12.1–182
Murakoshi, Nozomi, 12.1–24
Murcray, W. B., 12A–167, 12A–168
Muretov, N. S., 12.1–96
Murray, J. R., 12.1–95
Mustel', E. R., 12.1–115

Nack, B., 12A–86
Naffziger, L. M., 12.1–201
Nagei, M. R., 12.1–312
Nagler, K. M., 12.1–87
Nakagawa, Yoshinari, 12.1–361
Nakata, Yoshiaki, 12A–169
Nanda, J. N., 12.1–172
Narasimbachar, V. S., 12.1–278
Narayana, Rao, N., 12.1–134, 12.1–192
Nature, 12.1–262
Nature, Paris, 12.1–414
Naturwissenschaftliche Rundschau, 12A–247
Negaard, B. J., 12A–160
Neilburger, M., 12.1–279
Nemoto, S., 12.1–268
Nesina, L. V., 12.1–209
Netherlands Meteorologisch Instituut, 12A–170
Neuberger, H., 12.1–280
N. Y. Univ. College of Engineering, Dept. of Met. and Oceanog., 12.1–286, 12.1–289
Newfeld, E. L., 12A–91
News of Norway, 12A–68
Newton, H. W., 12A–171
Nezhikhovskiĭ, R. A., 12.1–205. 12.1–207
Nichols, B., 12A–31, 12A–172, 12A–173, 12A–180
Nicolet, M., 12.1–275, 12.1–292, 12A–174
Nikandrov, V. Ia., 12.1–375
Nikolaev, V. A., 12.1–308
Norske Institutt for Kosmisk Fyskii, 12A–176
Norway Geofysiske Kommisjon, 12A–87
Novák, V., 12.1–41
Noxon, J., 12A–65
NSF Grant Y/1.14/177, 12A–49
NSF Grant Y/22.6/327, 12A–57
Nunn, D. E., 12.1–302
Nyui, Kōichi, 12.1–251

O'Brien, B. J., 12A–177
O'Connor, J. F., 12.1–322
Odishaw, H. (ed.), 12.1–15
Oehser, P. H., 12A–119
Ogneva, T. A., 12.1–285
Olving, S., 12A–162
Omholt, A., 12A–48, 12A–178, 12A–233
Onishchenko, S. M., 12.1–42
Öpik, E. J., 12.1–124
Orlova, N. S., 12.1–125
Ortner, J., 12A–63
Ouellet, C. E., 12.1–327
Owren, L., 12A–179, 12A–180

Pabo, N. V., 12A–8
Pagacz, E. A., 12.1–58
Palm, E., 12.1–363
Palmén, E., 12.1–273
Panofsky, H., 12.1–280, 12.1–345
Parkin, D. W., 12.1–281
Parmele, O. S., 12.1–321
Parsons, N. R., 12A–181
Pasák, V., 12.1–67
Paszyński, J., 12.1–65

Paton, J., 12A–45, 12A–182, 12A–183, 12A–184, 12A–185, 12A–186, 12A–187
Pavlenko, N. A., 12.1–314
Peach, V. (ed.), 12A–48
Pearse, R. W. B., 12A–188
Peixoto, J. P., 12.1–368
Pekeris, C., 12.1–189
Pellisari, L., 12.1–40
Pergamon Institute, N. Y., 12.1–17
Perkins, P. J., Jr., 12.1–45
Perrusset, M., 12.1–31
Peteris, P. J., 12.1–304
Peters, B., 12.1–15
Petersen, N. V., 12.1–157
Peterson, A. M., 12A–189
Peterson, L., 12A–251
Petkovšek, Z., 12.1–309
Petrie, W., 12A–190, 12A–191
Pettit, H. B., 12A–150
Philippot, J. Cl., 12.1–78
Phillpot, H. R., 12.1–253
Piggott, W. R., 12A–171
Pilsbury, R. K., 12.1–365
Pittsburgh Univ. Spectroscopy Lab., 12A–195
Platagea, Gh., 12.1–203
Platagea, M., 12.1–203
Platt, R. B., 12.1–66
Platzman, G. W., 12.1–297
Podzimek, J., 12.1–377
Pogosian, Kh. P., 12.1–359
Poklepa, V. F., 12.1–206
Poklepa, V. F., 12.1–206
Pokrovskaia, T. V., 12.1–320
Pollak, L. W., 12.1–282
Pooler, F., Jr., 12.1–87
Popescu, Elena, 12.1–411
Powers, J. J., 12.1–92
Presnell, R. I., 12A–129
Press, F., 12.1–159
Price, R. E., 12.1–141
Priestley, M. G. (transl.), 12A–29
Priroda, Moscow, 12A–193
Problemy Severa, No. 1, 12.1–19
Prokudina, V. S., 12A–165
Pütter, P. St., 12.1–144

Queney, P., 12.1–300

Raghavan, K., 12.1–269
Rainbird, A. F., 12.1–69
Rakhmanov, V. V., 12.1–391
Rakipova, L. R., 12.1–317
Rawer, K., 12A–194
Raynor, G. S., 12.1–346
Răzvan, E., 12.1–210
Reid, G. C., 12A–96
Reid, J. L., Jr., 12.1–191
Reid, R. O., 12.1–180
Reifman, A., 12.1–139
Reitan, C. H., 12.1–366
Reiter, E. R., 12.1–343, 12.1–344
Rense, W. A., 12.1–152
Reshetov, V. D., 12.1–237
Resnick, R., 12A–195
Reuter, H., 12.1–256
Riblet, J., 12.1–239
Rich, T. A., 12.1–282
Richter, A., 12.1–88
Richter, N., 12.1–126
Roach, F. E., 12A–66, 12A–177, 12A–196, 12A–197, 12A–198
Roberts, W. J., 12.1–371
Roberts, W. O., 12.1–420, 12.1–421
Robertson, K. A., 12A–137
Robin, Simone, 12.1–111
Robin, Stephen, 12.1–111
Robinson, G. D., 12.1–360
Robison, W. C., 12.1–222
Rocard, Y., 12.1–168
Rodewald, M., 12.1–379, 12A–199, 12A–200, 12A–201
Roldan Seminario, E., 12.1–106
Romand, J., 12.1–108
Romick, G. J., 12A–49
Różański, S., 12.1–7
Rosemann, H., 12.1–165
Rouhani, A., 12.1–276
Ruche, J., 12.1–230
Rudometov, M. V., 12.1–392
Rumi, G. C., 12A–202
Rusin, N. P., 12.1–57
Rusz, A., 12.1–74
Rybner, J., 12A–203

Sänger, R., 12.1–264
St. Amand, P., 12A–14, 12A–204
Salmela, H. A., 12.1–356
Salmon, K., 12.1–425
Sandner, W., 12A–205, 12A–206, 12A–207, 12A–208
Săndulescu, M., 12.1–211
Spozhnikov, V. I., 12.1–391
Saskatchewan Univ. Physics Dept., 12A–115, 12A–209, 12A–220
Sato, T., 12.1–426
Saunders, W. E., 12.1–323
Savitskiĭ, G. A., 12.1–348
Schaefer, V. J., 12.1–270
Schaffner, H-J., 12.1–164
Scheffler, H., 12.1–105
Schendel, U., 12.1–246
Schindler, G., 12.1–424
Schlobohm, J. C., 12A–210
Schneider, O., 12A–211
Schneider, R., 12.1–32
Schoeck, P. A., 12A–48
Schove, D. J., 12A–212
Schriever, W. R., 12.1–89
Schubert, G., 12A–213
Schüepp, M., 12.1–255
Schulze, A., 12.1–74, 12.1–412
Schuman, L. M., 12.1–71
Schumann, G., 12.1–79
Science and Culture, 12A–39
Science News Letter, 12A–223
Scientific American, 12A–2
Seaton, S. L., 12A–214
Seddon, J. C., 12A–112
Seed, T. J., 12A–215, 12A–216
Sekera, Z., 12.1–280
Sekigawa, T., 12.1–426
Serruys, M., 12.1–274
Servajean, R., 12.1–112
Seydl, O., 12A–217
Shafer, R. J., 12.1–5
Shapley, A. H., 12.1–140, 12A–218, 12A–219
Shefov, N. N., 12A–165
Shepherd, G. G., 12A–220, 12A–221
Sherlock, R. H., 12.1–349
Shinohara, T., 12.1–244
Shklovskiĭ, I. S., 12A–222
Shorr, B. (ed.), 12.1–271
Shvarts, M. B., 12.1–248
Siddoway, F. H., 12.1–243
Simpson, G. C., 12.1–405
Simpson, J. A., 12.1–147
Singell, T. W., 12.1–93
Singer, I. A., 12.1–346
Shachkova, I. F., 12.1–248
Sky and Telescope, 12A–18
Slaucitajs, L., 12A–224
Slobodov, B. Ia., 12.1–340
Small, R., 12A–191
Smith, Carol, 12A–180
Smith, J. W., 12A–250
Smith, L. G. (ed.), 12.1–2
Smith, P. M., 12.1–23
Sobíšek, B., 12.1–241
Sōda, M., 12.1–386
Solomon, I., 12.1–381
Solov'ev, V. A., 12.1–437
Soltow, D. R., 12.1–226
Soma, K., 12.1–268
Somayajulu, Y. V., 12.1–134
Soo, S. L., 12.1–335
South Carolina. Sandhill Exp. Sta., 12.1–418
Spasski, M. F., 12.1–35
Spencer, N. W., 12.1–139
Split, Yugoslavia. . . . Vremenske Prilike, 12A–15
Sprague, M. A., 12.1–409
Srinivasan, T. R., 12.1–324
Srivastava, S. S., 12.1–192
Stakely, A. H., 12.1–5
Staley, D. O., 12.1–341
Stallabrass, J. R., 12.1–44
Stănescu, C. D., 12.1–427
Stark, R., 12A–180
Steffens, C., 12.1–283

Steiger, W. R., 12A–225
Stein, S., 12A–195, 12A–226
Steĭnberg, V. V., 12.1–325
Steinhauser, F., 12.1–401, 12.1–402
Stewart, H. B., Jr., 12.1–186
Stibbs, D. W. N., 12A–41
Stimson, T. E., Jr., 12A–227
Störmer, C., 12A–144, 12A–228, 12A–229, 12A–230
Stoertz, G. E., 12.1–50
Stoffregen, W., 12A–231, 12A–232, 12A–233
Stommel, H., 12.1–182
Stone, M. L., 12A–79
Stonely, R., 12.1–173
Stout, I. M., 12.1–204
Stoutjesdijk, Ph., 12.1–68
Strugaleva, E. V., 12.1–56
Strughold, H., 12.1–76
Stuart, F., 12.1–152
Styra, B. I., 12.1–80
Sucksdorff, G. E., 12A–234
Sugiura, J., 12.1–188
Sutton, G., 12.1–259
Swings, P., 12.1–130, 12.1–131, 12.1–132
Szepesi, D., 12.1–367

Tainer, L., 12.1–211
Takahashi, Tsutomu, 12.1–436
Takahashi, Y., 12.1–268
Takayanagi, Toshio, 12.1–113
Takenoshita, Yugoro, 12A–92
Tanaka, Haruo, 12.1–113, 12.1–114, 12.1–224
Tarble, R. D., 12.1–226
Tarnopol'skiĭ, A. G., 12.1–298
Taub, A. H., 12.1–15
Taylor, Sir G. I., 12.1–1
Teisseyre, R., 12.1–167
Temnikova, N. S., 12.1–406
ten Bruggencate, P., 12.1–109
Ten Kate, H., 12.1–231
Teunissen, D., 12.1–213
Thomas, C. W., 12.1–193
Thomas, E. R., 12.1–422
Thomsen, I. L., 12A–144, 12A–145, 12A–235, 12A–236, 12A–237
Tien, C. L., 12.1–335
Tippelskirch, H. V., 12.1–362
Todorov, K. D., 12.1–433
Trapnell, C. G., 12.1–389
Travelers Weather Research Center, 12.1–271
Trénel, M., 12.1–328
Trettel, D. W., 12.1–95
Troeger, H., 12.1–332
Tromsö, Norway, Nordlys-Observatoriet, 12A–176
Tsesevich, V. P., 12.1–154
Turner, H. S., 12.1–337
Tverskaia, N. P., 12.1–376
Tyczka, Sabina, 12.1–400

Ueji, T., 12.1–329
Ulanova, E. S., 12.1–9
Undt, W., 12.1–415
Ungstrup, E., 12A–203
U. S. Air Force, Cambridge Research Center, 12.1–2
U. S. Army Signal Research and Development Lab., 12.1–249
U. S. Brookhaven National Lab., 12.1–346
U. S. National Bureau of Standards, Boulder Labs., Colo., 12A–5
U. S. Office of Naval Operations, 12.1–16
Unwin, R. S., 12A–238

Vadhanapanich, C., 12.1–417
Van Allen, J. A., 12A–177, 12A–239, 12A–240
van der Poel, A. J., 12.1–68
van Duin, R. H. A., 12.1–330
Van Isacker, J., 12.1–294
Van Mieghem, J., 12.1–294
Van Sabben, D., 12A–241, 12A–242
Vassy, A., 12A–243, 12.1–276
Vassy, E., 12.1–127, 12A–243
Vegard, L., 12A–244
Veldkamp, J., 12.1–21
Veronis, G., 12.1–185
Veselovskiĭ, M. S., 12.1–35
Vestine, E. H., 12A–245
Vilkner, H., 12.1–219
Visscher, H. B., 12.1–5
Visser, S. W., 12A–246
Vitel's, L. A., 12.1–121
Vodar, B., 12.1–108
Vogan, E. L., 12A–75, 12A–96
Voge, J., 12.1–100
Voigt, H. H., 12.1–109
Vonnegut, B., 12.1–430
Vsesoiuznoe Geograficheskoe obshchestvo, 12.1–30
Vtiurin, B. I., 12.1–195

Waddington, D. C., 12A–77
Waldmeier, M., 12.1–107
Wallace, L., 12.1–434
Wang, S. C., 12A–79
Warnecke, G., 12.1–326
Wartena, L., 12.1–372
Watkins, C. D., 12A–91, 12A–248
Weaver, J. T., 12A–53
Weber, H., 12.1–328
Weeks, W. F., 12.1–194
Weill, G., 12A–249
Weise, R., 12.1–53, 12.1–55
Weiss, A. A., 12A–250
Wellington, New Zealand, Carter Observatory, 12A–78, 12A–144, 12A–145, 12A–146, 12A–237
Wentworth Institute, Boston, Mass., 12.1–2
Weston, E. T., 12.1–90
Wetterlotse, Hamburg, 12A–192
Whiting, R. M., 12.1–5
Williams, Esther L., 12.1–66
Wilson, R. W., 12.1–15
Winckler, J. R., 12A–251
Wiśniewski, W., 12.1–83
Witte, K., 12.1–54
Wollschläger, Hannelore, 12.1–284
Wood, R. C., 12.1–245
Woodruff, G. B., 12.1–350
Woods Hole Oceanographic Institution, 12.1–383
Workman, E. J., 12.1–435
Worzel, J., 12.1–189
Woszczyk, A., 12.1–132
Wright, J. W., 12A–252
Wurtele, M. G., 12.1–355

Yennie, D., 12.1–189
Young, R., 12.1–189

Zeitschrift für Meteorologie, 12A–175
Zimmermann, G., 12.1–74
Zimont, I. L., 12.1–202
Zolotukhin, A. A., 12.1–198

INDEX OF SUBJECTS

Abstract indexes, 12A–103
Abstracting periodicals, 12.1–18
Acclimatization of nutria, 12.1–12
Acoustical impedance, 12.1–161
Acoustical propagation, 12.1–438
Acoustical propagation below the surface, 12.1–161
Acoustical propagation in sea, 12.1–189
Acoustics, 12.1–15
Aerial snow cover photography, 12.1–391
Aerial snow surveys, 12.1–391
Aerobee H rockets, 12A–112

Aeronautical meteorological forecasting textbooks, 12.1–5
Aeronautical meteorological services, 12.1–32, 12.1–43
Aerosol size distribution, 12.1–282
Aerovanes, 12.1–346
Afforestation of weed infested soils, 12.1–67
Agricultural meteorology, 12.1–51, 12.1–52, 12.1–63
Agrometeorological conferences, 12.1–27
Agrometeorological forecasting textbooks, 12.1–9
Air-borne dust sampling, 12.1–278
Air-borne observational systems, 12.1–46
Air-borne radar, 12.1–46
Air-coupled tidal waves, 12.1–159
Air flow around buildings, 12.1–90
Air flow over mountains, 12.1–364
Air movements in stratosphere, 12.1–359
Air parcel trajectories, 12.1–355
Air sampling and analysis, 12.1–278, 12.1–281
Air sampling instruments, 12.1–46
Air-sea temperature observations, 12A–119
Air-soil temperature relationships, 12.1–330
Aircraft landing sites, 12.1–50
Aircraft weather reconnaissance systems, 12.1–46
Airglow, 12A–10
Airglow networks, 12A–55
Airplane investigations, 12.1–290
Airport climatology, 12.1–260
Airport forecasting manuals, 12.1–261
Airport visibility, 12.1–422
Albedo, 12.1–312
Albedo of grain fields, 12.1–58
All-sky auroral cameras, 12A–231
Amateur satellite observers, 12A–2
Annual atmospheric radioactivity variations, 12.1–79
Annual climatic data summaries, 12.1–229, 12.1–231
Annual meteorological data summaries, 12.1–230
Annual precipitation charts, 12.1–31
Annual pressure variations, 12.1–332
Annual rainfall summaries, 12.1–228
Annual service reports, 12A–87
Annual temperature variations, 12.1–398
Annual weather summaries, 12.1–231
Antarctic auroral observation techniques, 12A–48
Antarctic exploration (–1840), 12.1–23
Antarctic glaciology, 12.1–25
Antarctic ice, 12.1–25
Antarctic IGY operations, 12.1–22
Antarctic oceanography, 12.1–25
Antennas, 12.1–114
Anticyclones, 12.1–317
Arctic air masses, 12.1–308
Arctic geophysical research, 12A–8
Arctic ionosphere stations, 12A–219
Arctic research journals, 12.1–19
Arend-Roland Comet, 12.1–132
Argon, 12.1–275
Artificial auroras, 12A–51, 12A–77,12A–149
Artificial cloud modification, 12.1–266
Artificial clouds, 12.1–263
Artificial nucleation, 12.1–374
Artificial radioactivity, 12.1–86
Assman's psychrometer, 12.1–241
Asthma, 12.1–70
Astrophysics, 12.1–109
Atlases, 12.1–33
Atmospheric circulation, 12.1–121
Atmospheric circulation theories, 12.1–355
Atmospheric disturbances, 12.1–397
Atmospheric electricity, 12.1–280, 12.1–429
Atmospheric electricity conferences, 12.1–2
Atmospheric electricity measurement in upper atmosphere, 12.1–429
Atmospheric optics, 12.1–280
Atmospheric pollution, 12.1–274, 12.1–277, 12.1–280
Atmospheric pollution effects on metabolism, 12.1–72
Atmospheric pollution effects on visibility, 12.1–283
Atmospheric pollution studies, 12.1–279
Atmospheric pollution surveys, 12.1–221
Atmospheric potential gradient, 12.1–428
Atmospheric temperature, 12.1–359
Atmospheric turbulence, 12.1–334
Atomic explosion effects on the atmosphere, 12A–225
Atomic nitrogen in thermosphere, 12.1–292
August's psychrometer, 12.1–241
Aurora abstracts, 12A–103
Auroral australis, 12A–18, 12A–51, 12A–78, 12A–99, 12A–148, 12A–207, 12A–215, 12A–235, 12A–236, 12A–245
Aurora australis catalogs, 12A–211, 12A–237
Aurora australis data, 12A–181, 12A–201
Aurora borealis, 12A–84, 12A–179
Aurora manuals, 12A–235
Aurora observing stations, 12A–104
Aurora of Jan. 21–22, 1957, 12A–193
Aurora of Sept. 13, 1957, 12A–250
Aurora of Feb. 1958, 12A–110
Aurora of Sept. 4, 1958, 12A–242
Aurora symposia, 12A–48
Auroral activity, 12.1–127
Auroral arcs, 12A–67, 12A–177, 12A–225, 12A–197, 12A–198
Auroral atlases, 12A–115
Auroral bibliographies, 12A–133, 12A–195, 12A–229
Auroral catalogs, 12A–153
Auroral-cloudiness relationships, 12A–146
Auroral data, 12A–137, 12A–170, 12A–206, 12A–228
Auroral descriptions, 12A–57, 12A–69, 12A–147, 12A–175, 12A–187, 12A–197, 12A–230
Auroral distribution, 12A–45, 12A–65
Auroral drift, 12A–30, 12A–121, 12A–159, 12A–173,
Auroral effects, 12A–156
Auroral effects on radio stars, 12A–27
Auroral effects on radio wave propagation, 12A–1, 12A–31, 12A–113, 12A–151, 12A–163, 12A–180, 12A–203
Auroral emissions, 12A–130, 12A–150
Auroral forms, 12A–3, 12A–70, 12A–78, 12A–134

Auroral frequencies, 12A–146, 12A–155, 12A–206 to 208, 12A–236, 12A–245
Auroral-geomagnetic relationships, 12A–6, 12A–28, 12A–37, 12A–47, 12A–48, 12A–98, 12A–101, 12A–118, 12A–121, 12A–168, 12A–248
Auroral height determination, 12A–135, 12A–144
Auroral height determination by radar, 12A–238
Auroral height distribution, 12A–95, 12A–135
Auroral heights, 12A–53, 12A–54, 12A–64, 12A–67, 12A–93, 12A–145, 12A–228, 12A–230
Auroral hydrogen lines, 12A–81, 12A–82
Auroral instruments, 12A–11, 12A–209
Auroral intensities, 12A–204
Auroral intensity measurement techniques, 12A–150, 12A–220
Auroral intensity variations, 12A–168, 12A–243
Auroral investigations, 12A–42
Auroral ionization, 12A–76, 12A–89, 12A–117, 12A–118, 12A–154, 12A–173
Auroral ionization detection, 12A–226
Auroral ionization drift measurements, 12A–172
Auroral ionization of E layer, 12A–172
Auroral-ionospheric relationships, 12A–38, 12A–122, 12A–169, 12A–202, 12A–218, 12A–233, 12A–244
Auroral latitudes, 12A–243
Auroral layer ionization, 12A–194
Auroral luminescence, 12A–13
Auroral luminosity, 12A–62, 12A–198
Auroral models, 12A–223
Auroral morphology, 12A–158
Auroral motions, 12A–6, 12A–70, 12A–154
Auroral networks, 12A–55
Auroral nitrogen bands, 12A–19, 12A–190
Auroral observation, Antarctica, 12A–83
Auroral observation manuals, 12A–46, 12A–182
Auroral observation program, 12A–174, 12A–182, 12A–192
Auroral observation techniques, 12A–34, 12A–85, 12A–216
Auroral observations, 12A–2, 12A–15, 12A–16, 12A–18, 12A–23, 12A–26, 12A–35, 12A–111, 12A–119, 12A–120, 12A–148, 12A–165, 12A–176, 12A–199, 12A–200, 12A–205, 12A–213, 12A–235, 12A–241
Auroral observations during eclipses, 12A–41
Auroral observations from ships, 12A–186
Auroral observations in Antarctic, 12A–128
Auroral observatories, 12A–49
Auroral periodicities, 12A–90
Auroral photograph calculations, 12A–144
Auroral photographs, 12A–70, 12A–179, 12A–229, 12A–230
Auroral photography, 12A–67, 12A–78, 12A–80, 12A–145, 12A–158
Auroral photography networks, 12A–231
Auroral photometry, 12A–12
Auroral physics research, 12A–209
Auroral pulsations, 12A–37, 12A–38
Auroral radiations, 12A–7, 12A–14, 12A–97, 12A–123, 12A–167, 12A–251
Auroral radio echoes, *see* Radio echoes from auroras
Auroral recorders, 12A–102, 12A–143
Auroral reflections, 12A–74
Auroral research, 12A–8, 12A–44, 12A–56, 12A–68, 12A–87, 12A–164
Auroral research with rockets, 12A–112
Auroral rotation phenomenon, 12A–249
Auroral-solar relationships, 12A–21, 12A–120, 12A–160, 12A–179, 12A–245, 12A–247
Auroral spectra, 12A–11, 12A–19, 12A–48, 12A–60, 12A–94, 12A–115, 12A–125, 12A–157, 12A–178, 12A–188, 12A–191, 12A–222
Auroral spectral intensity, 12A–20
Auroral spectrographs, 12A–114
Auroral spectrometry, 12A–209
Auroral spectroscopy, 12A–59, 12A–244
Auroral streamer drift, 12A–139
Auroral studies, 12A–132
Auroral temperatures, 12A–221
Auroral theories, 12A–73, 12A–109, 12A–130, 12A–229, 12A–234
Auroral zone attenuation of short waves, 12A–5
Auroral zone disturbances, 12A–72, 12A–202
Auroral zone temperatures, 12A–190
Auroral zones, 12A–99, 12A–224
Auroras, 12.1–291, 12A–10, 12A–17, 12A–29, 12A–40, 12A–52, 12A–58, 12A–64, 12A–66, 12A–71, 12A–88, 12A–108, 12A–127, 12A–140, 12A–152, 12A–184, 12A–185, 12A–214, 12A–229, 12A–234, 12A–246, 12A–251
Auroras, Mexico, 12A–4
Australian National Antarctic Research Expedition, 12.1–399
Automobile exhaust pollution, 12.1–274, 12.1–277

Ballistic density, 12.1–94
Ballistic meteorology correctors, 12.1–94
Ballistic wind corrections, 12.1–94
Balloon-borne neutron counters, 12A–123
Balloon launching, 12.1–237
Balloon measurements of auroras, 12A–7
Barotropic vorticity equations, 12.1–297
Bibliographies, 12A–87
Bibliography of urban climates, 12.1–7
Bioclimatology, 12.1–14, 12.1–415
Bioclimatology of Inowrocław, 12.1–400
Biography of René Descartes, 12.1–38
Biography of Macedonio Melloni, 12.1–40
Biography of V. Novak, 12.1–41
Bottom stress, 12.1–180
Boundary layer, 12.1–296
Bristow, Gerald C., 12.1–37
British participation in IGY, 12A–106
Bubble theory, 12.1–383
Building effects on wind, 12.1–90
Building illumination, 12.1–313
Building resistance, 12.1–348

Calluna heath, 12.1–68
Canadian participation in IGY, 12A–39
Carbon dioxide in oceans, 12.1–
Carbon dioxide variations, 12.1–272
Carbon disulfide in atmosphere, 12.1–273
Carbon monoxide in atmosphere, 12A–188
Careers in astranautics, 12.1–156
Cave microclimatology, 12.1–411
Cave temperatures, 12.1–411
Chapman-Ferraro theory, 12A–223
Chernozem, 12.1–416
Chloride nuclei size determination, 12.1–377
Circumpolar westerlies, 12.1–417
Clear air turbulence, 12.1–337
Climate of East Africa, 12.1–413
Climate of French Polynesia, 12.1–397
Climate of Greece, 12.1–13
Climate of Heard Island, 12.1–399
Climate of Iberian Peninsula, 12.1–398
Climate of Inowrocław, 12.1–400
Climate of Iraq, 12.1–372
Climate of Lvov, 12.1–260
Climate of Negev, Israel, 12.1–232
Climate of southern Tadzhik S.S.R., 12.1–12
Climate of Syowa Base, 12.1–24
Climate of Tibet, 12.1–414
Climate of U.S.S.R., 12.1–4
Climatic changes, 12.1–214, 12.1–216
Climatic charts, 12.1–219
Climatic classification techniques, 12.1–412
Climatic data, 12.1–372
Climatic data for Argentine Antarctic, 12.1–25
Climatic data for Kazakh S.S.R., 12.1–59
Climatic data for planning electric power lines, 12.1–96
Climatic data for Pricaspia, 12.1–59
Climatic laboratories, 12.1–395
Climatic trends, 12.1–34
Climatic zones, 12.1–413
Climatological yearbooks, 12.1–227
Cloud droplet collision, 12.1–376
Cloud frequency data, 12A–146
Cloud height probabilities, 12.1–381
Cloud photogrammetry, 12.1–263
Cloud photography, 12.1–427
Cloud seeding evaluation, 12.1–267, 12.1–269
Cloud seeding studies, 12.1–266
Cloud seeding with salt, 12.1–265
Cloud seeding with silver iodide, 12.1–268, 12.1–270
Cloud-to-ground lightning, 12.1–431
Cloud vortices, 12.1–383
Coalescence of drops, 12.1–376
Coastal currents, 12.1–352
Coastal pilot handbooks, 12.1–25
Cold air formation, 12.1–305
Cold front models, 12.1–309
Cold front retardation by orographic obstacles, 12.1–309
Cold fronts, 12.1–307
Cold poles, 12.1–325, 12.1–326
Cold spells, 12.1–308
Cold winters, 12.1–404
Collected papers of G. I. Taylor, 12.1–1
Comet spectra, 12.1–131
Comet spectra atlases, 12.1–130
Comet tails, 12.1–133
Condensation nuclei spectrum, 12.1–377
Conifers, 12.1–64
Constant level balloons, 12.1–236
Continental formation, 12.1–172
Continents, 12.1–173
Contrails, 12.1–290
Convective cells, 12.1–362
Convective clouds, 12.1–382
Convective currents, 12.1–362
Convective heat transfer, 12.1–361
Convective motion, 12.1–382
Corpuscular radiation effects on aurora, 12A–171
Corpuscular radiation effects on comets, 12.1–133
Cosmic dust, 12.1–281
Cosmic radiation, 12.1–15, 12A–251
Cosmic ray intensity, 12A–88
Cosmic ray variations, 12.1–147
Cotton weather services, 12.1–27
Cover effects on frost damage, 12.1–418
Cumulonimbus clouds, 12.1–263
Cumulus cloud structure, 12.1–383
Cup anemometers, 12.1–244
Current instruments, 12.1–191
Cyclogenesis, 12.1–295
Cyclone circulation, 12.1–342
Cyclone-cold mass relationships, 12.1–307
Cyclone movement, 12.1–307
Cyclonic microseisms, 12.1–306

D layer, 12.1–143
D layer height, 12.1–116
D region, 12A–233
Danjon's law, 12.1–127
Daylight auroras, 12A–187
Deep sea temperatures, 12.1–187
Descartes, René, 12.1–38
Dew, 12.1–222
Dew measurement techniques, 12.1–222
Dew point variations, 12.1–367
Dew recorders, 12.1–243, 12.1–248
Diffusion cloud chambers, 12A–2
Diffusion coefficient, 12.1–338
Diffusion of gases, 12.1–334
Diffusion of heavy particles, 12.1–338
Dislocation theory of earthquakes, 12.1–167
Dissymmetry between hemispheric glaciations, 12.1–216
Diurnal auroral variations, 12A–89, 12A–98, 12A–168
Diurnal emission spectra variations, 12A–59
Diurnal geomagnetic variations, 12A–155
Diurnal gustiness variations, 12.1–344
Diurnal pressure variations, 12.1–331
Diurnal solar radiation means, 12.1–311
Diurnal temperature variations, 12.1–418
Diurnal wind variations, 12.1–341
Diurnal wind variations, 12.1–341
Doppler displacement of auroral echoes, 12A–129
Drainage design, 12.1–208
Drift currents, 12.1–353
Drop coagulation, 12.1–437
Drop velocity, 12.1–384

Droplet evaporation textbooks, 12.1–11
Drosometer comparisons, 12.1–247
Drosometers, 12.1–222
Drought, 12.1–231
Drought influence on coffee shrub flowering, 12.1–58
Dynamic meteorology, 12.1–3
Dynamic soil analysis, 12.1–170

E layer, 12.1–139, 12A–138
Earth-atmosphere radioactive exchange, 12.1–80
Earth's crust, 12.1–172
Earthquake mechanism, 12.1–164
Earthquakes, 12.1–167
East-west auroral motion, 12A–30, 12A–159
Ekman theory, 12.1–352
Electric field theory of auroras, 12.1–146
Electric sounding of ice, 12.1–218
Electrical charges on drops, 12.1–376, 12.1–436, 12.1–437
Electrical properties of dew, 12.1–436
Electrojet stream theory, 12A–159
Electromagnetic wave scattering, 12.1–105
Electronic data processing, 12.1–46, 12.1–249
Electrophotometry, 12A–62
Elevometers, 12A–47, 12A–48
Emission line temperatures, 12A–166
Energy balance method of evaporation calculation, 12.1–369
Equatorial ring currents, 12A–106
Equivalent temperatures, 12.1–415
Evaporation, 12.1–415
Evaporation from forests, 12.1–68
Evaporation from lakes, 12.1–371, 12.1–372
Evaporation from soil, 12.1–370
Evaporation measurement comparisons, 12.1–372
Evaporation of droplets, 12.1–11
Evaporation of raindrops, 12.1–305
Evaporimeter comparisons, 12.1–246
Evaporimeters, 12.1–246
Evapotranspiration measurements, 12.1–369
Exhaust gases, 12.1–274

F layer tilts, 12A–226
F layers, 12A–124
F2 layers, 12A–156
Fabrics, 12.1–92
Fabry-Pérot interferometer, 12A–10
Fallout predictor, 12.1–88
Far ultraviolet spectrographs, 12.1–111
Field microclimatology, 12.1–66
Flood analysis, 12.1–203
Floods, 12.1–204
Fluorescence in upper atmosphere, 12A–222
Fog distribution, 12.1–380
Fog drops, 12.1–437
Fog effects on visibility, 12.1–378, 12.1–379
Forecasting methods, 12.1–258
Forecasting radioactive accumulation, 12.1–86
Forest caterpillars-tree growth relationships, 12.1–388
Forest influences, 12.1–65
Forest microclimatology, 12.1–66, 12.1–67
Forest shelter belt effects, 12.1–61
Forest temperatures, 12.1–68
Freezing nuclei, 12.1–374
Freezing of supercooled water, 12.1–375
Freezing of water drops, 12.1–373
Frost damage to vineyards, 12.1–53
Frost protection of plants, 12.1–55
Frost danger, 12.1–53
Frost protection of vineyards, 12.1–53, 12.1–54
Funicular railways, 12.1–91

Galactic radio noise, 12.1–134
Gas consumption forecasts, 12.1–95
Gas distribution, 12.1–95
Gaseous composition of the atmosphere, 12.1–275
General circulation models, 12.1–299
General circulation studies, 12.1–294
General circulation theories, 12.1–300
Geodynamics, 12.1–173
Geographical climatology textbooks, 12.1–8
Geomagnetic data, 12A–176
Geomagnetic disturbance effects, 12A–28
Geomagnetic disturbances, 12A–98, 12A–101, 12A–199
Geomagnetic drift, 12.1–149
Geomagnetic effects on cosmic rays, 12.1–147
Geomagnetic field, 12.1–147
Geomagnetic field variability, 12.1–148
Geomagnetic instruments, 12.1–145
Geomagnetic micropulsations, 12A–1
Geomagnetic poles, 12.1–148, 12.1–149
Geomagnetic theories, 12.1–148, 12.1–149
Geomagnetic variations, 12A–72
Geophysical research, 12A–87
Geophysics serials, 12.1–17
Geostrophic wind field, 12.1–355
Geostrophic wind validity studies, 12.1–356
Geostrophic winds, 12.1–354
Giant nuclei, 12.1–377
Glacial ages, 12.1–213
Glacial deposits, 12.1–212
Glaciation, 12.1–390
Glaciation theories, 12.1–216
Glacier-meteorological observations, 12.1–408
Glacier microclimatology, 12.1–408
Glacier research, 12.1–408
Glacier thickness measurement techniques, 12.1–218
Glaciers, Northwest U. S., 12.1–408
Gliding, 12.1–48, 12.1–49
Gliding meteorology textbooks, 12.1–6
Global climate, *see* World climate
Gradient winds, 12.1–340
Graphical presentation, 12.1–219
Grating spectrometers, 12.1–315
Green flash, 12.1–423
Ground reflectance, 12.1–312
Gustiness, 12.1–344
Gyromagnetic effects, 12.1–137

H-bomb tests, 12.1–168
Hail, 12.1–258
Hail damage to airplanes, 12.1–47
Hail forecasting, 12.1–47
Hail structure, 12.1–394
Hailstone formation, 12.1–393
Hailstone size, 12.1–394

Halo phenomena, 12A–246
Handbooks, 12.1–395
Harmonic analysis of pressure data, 12.1–332, 12.1–333
Heat conductivity of soils, 12.1–330
Heat exchange air-water surface, 12.1–209
Heat transfer, 12.1–360
Heat treatment of soils, 12.1–330
Height of the atmosphere, 12.1–333
Heliographs, 12.1–135
Helium atmosphere, 12.1–275
High altitude balloons, 12.1–237
High altitude flying, 12.1–438
High altitude research, 12.1–290
High frequency direction finder, 12.1–153
Historic auroras, 12A–153, 12A–212, 12A–217
Historic weather records, 12A–119
History of climatology, 12.1–35, 12.1–36
History of Soviet meteorological services, 12.1–28
History of turbulence theory, 12.1–1
Humid tropics, 12.1–396
Humidity variations, 12.1–245
Hurricane "Helen" (1958), 12.1–267
Hurricane damage reports 12.1–303
Hurricane genesis, 12.1–303
Hurricane studies, 12.1–302
Hurricane tracks, 12.1–303
Hydraulic research projects, 12.1–197
Hydroelectric power stations, 12.1–210
Hydrogeology textbooks, 12.1–10
Hydrography of Congolese rivers, 12.1–200
Hydrologic conferences, 12.1–27
Hydrologic services, 12.1–198
Hydrology, 12.1–197
Hydrology of Ukraine, 12.1–199
Hydrometeorology, 12.1–200
Hygroscopic nuclei, 12.1–265

Ice crystal formation in supercooled water, 12.1–373
Ice crystal nuclei, 12.1–268
Ice formations, 12.1–195
Ice movement symposia, 12.1–217
Ice nuclei, 12.1–393
Ice reconnaissance, 12.1–14
Icing of aircraft experiments, 12.1–45
Icing of helicopters, 12.1–44
Icing of transmission lines, 12.1–96
Icing prevention, 12.1–44
Illumination theories, 12.1–313
Indian monsoon, 12.1–342, 12.1–343
Industrial waste water, 12.1–211
Infrared absorption hygrometers, 12.1–245
Infrared auroral emissions, 12A–20
Infrared auroral line, 12A–157
Infrared radiation, 12A–167
Infrared radiation measurement techniques, 12A–14
Infrared spectroscopy, 12.1–315
Insect control, 12.1–64
Instability, 12.1–295
Interferential filters, 12.1–315
Interferometry of aurora and airglow, 12A–166
Interglacial formation, 12.1–214
International Geophysical Year, 1957–1958, 12.1–20, 12A–105
IGY airglow program, 12A–107
IGY auroral observation instructions, 12A–83
IGY auroral program, 12A–2, 12A–4, 12A–23, 12A–25, 12A–43, 12A–45, 12A–46, 12A–49, 12A–55, 12A–56, 12A–85, 12A–106, 12A–107, 12A–174, 12A–185, 12A–186, 12A–211, 12A–245
IGY auroral stations, 12A–39
IGY cosmic ray stations, 12A–39
IGY geomagnetic program, 12.1–145
IGY glaciology program, 12.1–408
IGY ionosphere program, 12A–219
IGY networks, 12A–104, 12A–231
IGY night airglow network, 12A–196
IGY program, 12.1–107, 12A–42, 12A–68, 12A–105, 12A–192
IGY solar activity program, 12.1–122, 12.1–420, 12.1–421
International Pyrheliometric Scale, 1956, 12.1–311
International Scientific Radio Union, 12.1–140
International unit of absolute temperature, 12.1–240
Interplanetary flights, 12.1–76, 12.1–150, 12.1–151
Ion distribution near shelter belts, 12.1–61
Ionization measurement techniques, 12.1–139
Ionization of gases, 12.1–136, 12.1–138
Ionization phenomena, 12A–233
Ionogram atlases, 12A–252
Ionosphere, 12.1–107, 12A–8
Ionospheric absorption, 12A–202
Ionospheric data, 12A–176
Ionospheric density variations, 12.1–157
Ionospheric disturbances, 12.1–141, 12.1–143, 12A–156
Ionospheric gyro-waves, 12.1–137
Ionospheric ionization, 12.1–291
Ionospheric measurements, 12.1–142
Ionospheric radio wave propagation, 12A–5
Ionospheric radio wave reflection, 12A–226
Ionospheric records, 12A–252
Ionospheric research, 12A–164
Ionospheric soundings, 12.1–140, 12A–68
Ionospheric tides, 12A–124
Ionospheric wind measurement techniques, 12.1–144
Ionospheric winds, 12A–159
Irrigation experiments, 12.1–56

Jet stream, 12.1–358
Jet stream effects on cyclogenesis, 12.1–295
Jet stream maxima, 12.1–343
Jet stream sailplane flying, 12.1–358
Jet stream turbulence, 12.1–358

Kinetic energy in atmosphere, 12.1–293
Kirchoff's laws, 12.1–313
Kokoulin, Pavel Pavlovich, 12.1–39
Koschawa wind, 12.1–347
Krakatoa eruption (1883), 12.1–159, 12.1–160

Land uplift, 12.1–174
Large scale vertical motions, 12.1–257

Large scale weather processes, 12.1–147
Lee wave flights, 12.1–48
Lee waves, 12.1–364
Light filters, 12.1–427
Lightning discharges, 12.1–431
Lightning flashes, 12.1–435
Lightning forms, 12.1–433
Lightning spectrum, 12.1–434
Lightning statistics, 12.1–432
Local forecast studies, 12.1–260
Long range forecasting, 12.1–259
Long waves, 12.1–363
Lorentzian electronic plasmas, 12.1–136
Love waves, 12.1–162
Low frequency hiss, 12A–151
Low latitude auroras, 12A–4, 12A–24, 12A–32, 12A–45, 12A–47, 12A–48, 12A–136, 12A–160
Low level turbulence, 12.1–336
Lunar atmosphere, 12.1–124
Lunar air density, 12.1–124
Lunar crater structures, 12.1–126
Lunar eclipse effects, 12.1–123
Lunar photometry, 12.1–125
Lunar temperatures, 12.1–123

Magnetic disturbances, 12A–224
Magnetic effects, 12A–1
Magnetic effects on low latitude auroras, 12A–24
Magnetic field effects on convection, 12.1–361
Magnetic field effects on ionization of gases, 12.1–138
Magnetic field effects on ionosphere, 12.1–136
Magnetic micropulsations, 12A–37, 12A–38
Magnetic observations, 12.1–142
Magnetic storm effects on radio communication, 12A–92
Magnetic storms and auroras, 12A–73, 12A–173
Margules' formula, 12.1–296
Marine accidents, 12.1–378, 12.1–379
Marine observations, 12A–192
Maximum temperatures, 12.1–324
Medical meteorology, 12.1–73
Melloni, Macedonio, 12.1–40
Meridional cross sections, 12.1–339
Mesoanalysis of thunderstorms, 12.1–305
Meteor radiant determination, 12.1–225
Meteor trails, 12.1 129, 12A–138
Meteor velocities, 12.1–223
Meteorological conditions for spraying, 12.1–64
Meteorological observations, 12.1–24, 12A–35
Meteorological photography, 12A–22
Meteorological research, 12A–87
Meteorological research stations, 12.1–29
Meteorological services, 12.1–31, 12.1–198
Meteorology-astronomy relationships, 12.1–106
Meteors, 12A–124
Microbarographs, 12.1–242
Microclimate forecasting, 12.1–66
Microclimates, 12.1–65
Microclimatic data, 12.1–369
Microclimatic influences on agriculture, 12.1–409
Microclimatological research, 12.1–406
Microclimatology, 12.1–52
Micromanometers, 12.1–242
Micrometeorological studies, 12.1–61
Micrometeorological wind profiles, 12.1–336
Microseism periods, 12.1–166
Microseisms-cold front relationships, 12.1–306
Minimum temperature frequencies, 12.1–321
Moisture distribution, 12.1–366
Momentum-heat diffusion relationships, 12.1–360
Mountain climates, 12.1–414
Mountain waves, 12.1–363
Multiple geophones, 12.1–163

Natural radioactivity, 12.1–86
Netherlands participation in IGY, 12.1–21
Neutron intensities, 12A–123
Night airglow, 12A–14, 12A–21, 12A–44, 12A–58, 12A–59, 12A–64, 12A–66, 12A–127, 12A–161, 12A–214, 12A–247
Night airglow intensities, 12A–204
Night airglow investigations, 12A–42
Night airglow research, 12A–196
Night airglow spectra, 12A–188, 12A–222, 12A–243
Night sky brightness measurement techniques, 12A–52, 12A -62
Night sky spectroscopy, 12A–59
Nocturnal cooling, 12.1–256, 12.1–323
Nocturnal minimum temperature forecasting, 12.1–256
Nocturnal radiation calculations, 12.1–316
Northern Hemisphere charts, 12.1–368
Novák, Václav, 12.1–41
Nuclear explosion effects, 12A–77
Nuclear explosions in upper atmosphere, 12A–149

Oak groves, 12.1–68
Obituary of Gerald C. Bristow, 12.1–37
Obituary of P. P. Kokoulin, 12.1–39
Objective forecasting aids, 12.1–5
Observational data, 12.1–232
Ocean-atmosphere interaction, 12.1–175, 12.1–353
Ocean current structure, 12.1–185
Ocean current theories, 12.1–184
Ocean current variations, 12.1–188
Ocean currents, 12.1–186
Ocean temperature-salinity analysis, 12.1–187
Ocean temperatures, 12A–35
Ocean wave recorders, 12.1–192
Optical phenomena, 12A–246
Optical phenomenon data, 12A–170
Origin of atmospheric gases, 12.1–275
Orographic effects on westerlies, 12.1–417
Orographic effects on winds, 12.1–336, 12.1–347
Orographic rainfall, 12.1–389
Orographic waves, 12.1–365
Outdoor illumination, 12.1–312
Outer atmosphere research, 12.1–150, 12.1–151
Over the horizon transmission of television signals, 12.1–103
Oxidant concentration in air, 12.1–279
Ozone absorption, 12A–191
Ozone concentration, 12.1–276
Ozone data, 12A–176
Ozone variations at ground level, 12.1–276

Parachute drogues, 12.1–190
Particle dynamics, 12.1–384
Pastures, 12.1–59
Periodicities, 12.1–119
Peruvian Meteorological Service, 12.1–106
Phenological services, 12.1–30
Phenology, 12.1–58
Photochemistry of upper atmosphere, 12.1–288
Photoelectric cells, 12A–14
Photoelectric observation, 12A–9
Photoelectric receivers, 12A–114
Photographic observation techniques, 12A–225
Photographs of sun, 12.1–152
Photometers, 12.1–239
Photometry of sun's corona, 12.1–120
Physics handbooks, 12.1–15
Physiological effects of space flights, 12.1–75
Pleistocene temperatures, 12.1–405
Plowing effects on soil moisture, 12.1–56
Polar front theories, 12.1–300
Polar incidence of aurora, 12A–86
Polar magnetic storms, 12.1–146
Polar Year data, 1932–1933, 12A–228
Polarization, 12.1–426, 12.1–427
Pollen analysis, 12.1–213
Polydisperse aerosols, 12.1–282
Potential gradient between earth and ionosphere, 12.1–429
Potential gradient-weather relationships, 12.1–428
Precipitable water data, 12.1–366
Precipitation effects on aspen growth, 12.1–388
Precipitation frequencies, 12.1–386
Precipitation variations, 12.1–118
Pressure distribution in typhoons, 12.1–301
Pressure reduction, 12.1–233
Probable extreme flow determination, 12.1–200
Probe techniques, 12.1–139
Project Skyfire, 12.1–270
Pyrheliometer comparisons, 12.1–238

Quantitative rainfall forecasting, 12.1–257
Quaternary climates, 12.1–215
Quaternary period, 12.1–214, 12.1–215

Radar applications, 12.1–226
Radar echoes from auroras, 12A–29, 12A–61, 12A–129, 12A–131, 12A–134, 12A–142, 12A–143, 12A–162, 12A–173, 12A–238, 12A–250
Radar echoes from meteors, 12.1–225
Radar echoes from precipitation, 12.1–384
Radar observation of auroras, 12A–50, 12A–79, 12A–210, 12A–215, 12A–216
Radar observations, 12.1–32
Radar photographing of sea current and ice, 12.1–196
Radar photography, 12.1–196
Radiation climate of fields, 12.1–57
Radiation fog, 12.1–367
Radio communication, 12.1–99, 12.1–101
Radio echoes from auroras, 12A–28, 12A–31, 12A–33, 12A–36, 12A–75, 12A–91, 12A–92, 12A–100, 12A–117, 12A–118, 12A–126, 12A–138, 12A–140, 12A–141, 12A–169, 12A–180, 12A–189, 12A–210, 12A–248
Radio echoes from meteors, 12.1–128, 12.1–129, 12.1–223
Radio echoes from moon, 12A–113
Radio frequency radiation, 12.1–105
Radio frequency radiation from auroras, 12A–96
Radio isotope distribution, 12.1–77
Radio meteor observation techniques, 12.1–223
Radio meteorology parameters, 12.1–99, 12.1–104
Radio noise, 12A–1, 12A–97, 12A–151
Radio noise-auroral emission relationships, 12A–150
Radio observation of auroras, 12A–34, 12A–76, 12A–116
Radio reflections from auroras, 12A–63, 12A–232
Radio star scintillation, 12A–27
Radio telescopes, 12.1–135
Radio wave propagation, 12A–8, 12A–163
Radio wave propagation abstracts, 12A–103
Radio wave reflection, 12A–74
Radio wave scattering, 12A–91
Radio wave scattering by meteor trails, 12.1–128
Radio wave transmission, 12.1–98
Radio wave transmission loss, 12.1–102
Radioactive accumulation in soil, 12.1–86
Radioactive clouds, 12.1–81
Radioactive emanations, 12.1–80
Radioactive fallout, 12.1–79, 12.1–83
Radioactive fallout forecasting, 12.1–87
Radioactive fallout pattern forecasting, 12.1–88
Radioactive milk, 12.1–84
Radioactive nuclei, 12.1–264
Radioactive precipitation, 12.1–79, 12.1–80
Radioactive rainwater, 12.1–385
Radioactive soil, 12.1–85
Radioactivity in humans, 12.1–84
Radioactivity in the atmosphere, 12.1–78, 12.1–82, 12.1–354
Radioactivity in the upper atmosphere, 12.1–79
Radiocarbon dating, 12.1–212
Radiosonde chemical measurements, 12.1–288
Radiosonde comparisons, 12.1–250
Rainfall distribution, 12.1–269
Rainfall effects on ecology, 12.1–389
Rainfall height variations, 12.1–389
Rawin data, 12.1–249
Recombination rate measurements, 12.1–288
Record high temperatures, Pacific States (1958), 12.1–322
Record low temperatures, 12.1–325, 12.1–326
Red auroral line, 12A–157
Reduction methods, 12.1–220
Reflecting layer height, 12.1–100
Refractive index gradient, 12.1–99, 12.1–104
Refractive index variations, 12.1–99 to 12.1–101, 12.1 104
Ring currents, 12A–223
River discharge calculations, 12.1–205
River discharge forecasting, 12.1–206
River flow, 12.1–207

River runoff, 12.1–206
River water volume, 12.1–205
Rocket measurement of auroral radiation, 12A–112, 12A–240
Rocket observations, 12A–152
Rocket observations of sun, 12.1–152
Rocket propulsion, 12.1–155
Rocket spectrograph observations, 12.1–291
Rockets, 12A–247
Rotational temperatures, 12A–190
Rotors, 12.1–364
Runoff coefficient, 12.1–202
Runoff regime, 12.1–201

Salinity distribution, 12.1–181
Sand dune formation, 12.1–215
Satellite auroral radiation observation techniques, 12A–239
Satellite brightness variations, 12.1–154
Satellite orbits, 12.1–157
Satellite tracking, 12.1–153
Satellite uses, 12A–247
Science congresses, 12A–247
Scintillation, 12.1–105
Sea currents, 12.1–178
Sea ice properties, 12.1–194
Sea level changes, 12.1–174
Sea surface temperature, 12.1–175
Sea surface temperature variations, 12.1–183, 12.1–403
Sea temperature data, 12.1–182
Sea water salinity data, 12.1–181
Seasonal changes in soil temperature, 12.1–327
Seasonal metabolism variations, 12.1–72
Seasonal stream flow forecasts, 12.1–207
Secular trends in temperature, 12.1–403
Seismic recordings, 12.1–142
Seismic surface waves, 12.1–170
Seismic waves, 12.1–168
Seismographs, 12.1–163
Seismology, 12.1–163 to 12.1–165, 12.1–169, 12.1–170
Semidiurnal pressure variations, 12.1–289
Serial publications, 12.1–17, 12.1–19
Series reduction, 12.1–220
Sferics, 12A–8
Sferics observation, 12.1–142
Sheep breeding, 12.1–59
Shelter belt effects on microclimate, 12.1–63
Shelter belts, 12.1–63
Shock wave observation techniques, 12.1–438
Silver iodide diffusion, 12.1–264
Silver iodide smoke generators, 12.1–270
Singularities, 12.1–259
Sky brightness measurement techniques, 12.1–239, 12.1–224
Sky light color measurements, 12.1–424
Smoke plume meteorology, 12.1–334
Snow cover duration charts, 12.1–401
Snow cover observations, 12.1–390
Snow cover radiation, 12.1–26
Snow density calculation, 12.1–392
Snow load on houses, 12.1–89
Snowstorms in spring, 12.1–308
Soil moisture effects on evaporation, 12.1–370
Soil moisture studies, 12.1–328
Soil temperature, 12.1–327
Soil temperature and soil moisture effects on facial eczema, 12.1–60
Soil temperature data, 12.1–416
Soil temperature-soil moisture relationships, 12.1–328
Solar corpuscular currents, 12.1–115
Solar corpuscular influences on upper atmosphere, 12.1–317,
Solar eclipse, June 1954, 12A–41
Solar eclipse aurora, 12A–183
Solar effects on auroras, 12A–125
Solar eruptions, 12.1–115
Solar flare effects on cosmic rays, 12.1–117, 12A–88
Solar flares, 12A–171
Solar-geophysical relationships, 12.1–117
Solar-ionospheric relationships, 12.1–117
Solar Lyman alpha radiation, 12.1–152
Solar observations, 12.1–107
Solar observatories, 12.1–122
Solar radiation data, 12.1–311
Solar radiation variations, 12.1–118, 12.1–405
Solar radio emissions, 12.1–135
Solar radio noise, 12A–95
Solar radio noise equipment, 12.1–113, 12.1–114
Solar radio noise measurement, 12.1–113
Solar spectrographs, 12.1–112
Solar spectrum, 12.1–109
Solar-terrestrial relationships, 12.1–420, 12.1–421
Solar-weather relationships, 12.1–118, 12.1–119, 12.1–121
Solar X-ray emission, 12.1–116
Sources of solar corpuscles, 12.1–115
Space flights with dogs, 12.1–75
Space medicine, 12.1–76, 12.1–151
Space technology, 12.1–150
Spectra of comet molecules, 12.1–130
Spectral line 5577 Å [OI], 12A–9
Spectrographic methods, 12.1–108
Spectrometer calibration, 12A–220
Spectrophotometric observation, 12A–64
Spectroscopic observation, 12.1–132
Spectroscopy, 12A–188
Spherical harmonics, 12.1–333
Sporadic E layer (Es), 12A–194
Sporadic E layer (Es) echoes, 12A–122
Sprinkling, 12.1–53 to 12.1–55
Stack meteorology, 12.1–97
Standard thermometer, 12.1–240
Star ecospheres, 12.1–110
Stations location indexes, 12A–104
Statistical analysis, 12.1–200
Statistical analysis of atmospheric processes, 12.1–271
Statistical forecasting, 12.1–253
Statistical theory of turbulence, 12.1–1
Statistics abstracts, 12.1–18
Storm analysis, 12.1–254
Storm surge computation, 12.1–179
Storm surges, 12.1–351
Strain-gage anemometers, 12.1–243
Stratospheric pressure, 12.1–289
Stream flow, 12.1–204
Street microclimatology, 12.1–410
Strong wind frequencies, 12.1–357
Sub-ice positioning, 12.1–193
Submarine relief influence on T wave refraction, 12.1–169
Subtropical jet stream, 12.1–252
Subvisual auroras, 12A–197

Sudden commencements, 12A–242
Sudden enhancements of atmospherics, 12A–71
Sun's corona, 12.1–120
Sunshine duration charts, 12.1–402
Sunshine duration data, 12.1–310
Sunspot cycle-lunar eclipse brilliance relationships, 12.1–127
Sunspot cycles, 12.1–119, 12A–90
Supercooled water drops, 12.1–375
Surf, 12.1–351
Surface inversions, 12.1–26
Surface wind variations, 12.1–341
Surface wind-visibility relationships, 12.1–422
Swamp microclimatology, 12.1–407
Swell, 12.1–178
Sydney-Nandi air route, 12.1–253
Synoptic climatology, 12.1–255
Synoptic climatology of Central Europe, 12.1–419
Synoptic studies of jet stream waves, 12.1–252
Synthetic seismograms, 12.1–161

Teaching of aeronautical meteorology, 12.1–43
Teaching of meteorology, 12.1–33
Telemetering systems, 12.1–226
Television signal transmission, 12.1–103
Temperature anomalies, 12.1–320
Temperature changes with depth, 12.1–327
Temperature distribution, 12.1–320
Temperature frequencies, 12.1–321
Temperature gradient effects on turbulence, 12.1–298
Temperature stratification, 12.1–209
Temperature trends, 12.1–319
Temperature variations, 12.1–118
Terrestrial magnetism, 12.1–145
Textbooks, 12A–229
Thermal balance of water surfaces, 12.1–182
Thermal diffusivity, 12.1–92
Thermal springs, 12.1–158
Thermodynamics, 12.1–280
300 mb planetary winds, 12.1–234
Thunderstorm activity, 12.1–432
Thunderstorm data, 12A–170
Thunderstorm electricity, 12.1–430
Thunderstorm photography, 12.1–304
Thunderstorms, 12.1–258
Tidal theories, 12.1–182
Topographic effects on clear air turbulence, 12.1–337
Topographic influences on temperature, 12.1–416
Tornado theories, 12.1–430
Toroid cells, 12.1–362
Traffic accidents, 12.1–74
Transosonde data utilization, 12.1–235
Transosonde diurnal winds, 12.1–234
Transosonde flight trajectories, 12.1–234
Transport of radioactive debris, 12.1–354
Tropopause height, 12.1–381
Tropopause profiles, 12.1–339
Tropopause structure, 12.1–286, 12.1–287
Tropospheric radio wave propagation, 12.1–98, 12.1–101, 12.1–102, 12A–8, 12A–132
Tropospheric radio wave reflection, 12.1–100
Tropospheric temperature variations, 12.1–284
Tropospheric variations over reservoirs, 12.1–285
Turbulence coefficient calculations, 12.1–298
Turbulence correlation functions, 12.1–335
Turbulence effects on ultrashort radio wave propagation, 12.1–100
Turbulence measurement instruments, 12.1–243
Turbulence theory, 12.1–1
Turbulent channel flow, 12.1–180
Turbulent heat transfer in water, 12.1–183
Turbulent transfer, 12.1–360
Turbulent transfer of heat, 12.1–26
Twilight, 12A–58
Twilight Na, 12A–176
Twilight luminescence, 12A–21
Twilight spectra, 12.1–425
Typhoon intensities, 12.1–301

UHF radar observation, 12A–79
Ultraviolet intensities, 12A–191
Ultraviolet spectra, 12.1–314
Underground alimentation, 12.1–206
Underground temperatures, 12.1–329
U.S.S.R. weather services, 12.1–28
U. S. exploration in Antarctic, 12.1–23
U. S. participation in IGY, 12.1–22
U. S. Quartermaster Research and Engineering Center, 12.1–395
Universities, 12.1–29
Upper air charts, 12.1–32
Upper air flow patterns, 12.1–343
Upper air humidity, 12.1–368
Upper air pressure computation, 12.1–233
Upper air pressure variations, 12.1–284
Upper air temperature forecasting, 12.1–253
Upper air wind analysis, 12.1–342
Upper air wind forecasting, 12.1–253
Upper air wind variations, 12.1–141
Upper atmosphere, 12A–124, 12A–222
Upper atmosphere bibliographies, 12A–195
Upper atmosphere models, 12A–227
Upper atmosphere physics, 12.1–291
Upper atmosphere research, 12A–164, 12A–227
Upper atmosphere structure, 12A–152
Upper atmosphere temperature measurement techniques, 12A–166
Urban climates, 12.1–410
Urban climatology textbooks, 12.1–7
Urban influences, 12.1–7

Vegetation influences on climate, 12.1–148
Vertical humidity distribution, 12.1–367
Vertical motion, 12.1–360
Vertical temperature gradient, 12.1–362
Vertical variations of meteorological elements, 12.1–285

- Vertical wind velocity spectrum, 12.1–345
- Vesuvius Observatory, 12.1–40
- Visibility, 12.1–283
- Visibility observation techniques, 12.1–42
- Visibility observations, 12.1–422
- Visual observation of auroras, 12A–46, 12A–83, 12A–86, 12A–249
- Visual teaching aids, 12.1–33
- Volcanic craters, 12.1–126
- Volcanic eruptions, 12. 1–60

- Warming of Arctic, 12.1–318
- Warming of North Atlantic, 12.1–403
- Water consumption, 12.1–387
- Water temperatures, Tadzhik S.S.R., 12.1–12
- Wave forecasting, 12.1–176
- Wave formation, 12.1–176
- Wave motion, 12.1–176, 12.1–178, 12.1–236
- Wave propagation, 12.1–15
- Weather control research, 12.1–262
- Weather-crop relationships, 12.1–52
- Weather effects on asthma, 12.1–70
- Weather effects on livestock, 12.1–60
- Weather effects on man, 12.1–73
- Weather effects on traffic accidents, 12.1–73, 12.1–74
- Weather sensitivity, 12.1–74
- Weather type classification, 12.1–255
- Weather type-climate relationships, 12.1–397
- Weather types, 12.1–254
- Well temperatures, 12.1–329
- Westward intensification of Polar front jet stream, 12.1–296
- Whistler research, 12A–164
- Whistlers, 12A–132
- Whole sky photography, 12A–22
- Wilson cloud chambers, 12A–2
- Wind damage to funiculars, 12.1–91
- Wind distribution, 12.1–359
- Wind driven currents, 12.1–352
- Wind driven ocean circulation, 12.1–184
- Wind effects on buildings, 12.1–93
- Wind effects on sea level, 12.1–176
- Wind effects on sea temperatures, 12.1–353
- Wind effects on water surfaces, 12.1–351
- Wind force data, 12.1–93
- Wind instruments, 12.1–221
- Wind load on houses, 12.1–89
- Wind load on structures, 12.1–348 to 12.1–350
- Wind measurement techniques, 12.1–221
- Wind profiles, 12.1–346
- Wind stress energy distribution in ocean, 12.1–185
- Wind stress on water, 12.1–180
- Wind tunnel experiments, 12.1–346, 12.1–393, 12.1–394
- Wind utilization, 12.1–48, 12.1–49
- Wind vector computations, 12.1–356
- Wind velocity distribution, 12.1–357
- Wind wave computation, 12.1–179
- Wind wave theories, 12.1–177
- Windbreak effectiveness, 12.1–62
- Windbreak purposes, 12.1–62
- Wooden houses, 12.1–89
- World climate, 12.1–8
- WMO Instruments and Methods of Observation Commission, 12.1–238

- X-radiation in auroras, 12A–7

INDEX OF GEOGRAPHICAL LOCATIONS

- NORTHERN HEMISPHERE, 12A–88
- SOUTHERN HEMISPHERE, 12A–88
- WESTERN HEMISPHERE, 12A–55
- POLAR REGIONS, 12A–155
- AFRICA
  - **East Africa,** 12.1–413
  - **Algeria**
    - Reggane, 12.1–168
  - **French West Africa,** 12.1–99
  - **Kenya,** 12.1–389
  - **Morocco,** 12.1–310
  - **Niger**
    - Ténéré, 12.1–215
  - **Nigeria,** 12.1–396
- ASIA, 12.1–320
  - **Central Asia,** 12.1–209
  - **China,** 12A–69, 12A–212
    - Tibet, 12.1–414
  - **India,** 12.1–342, 12.1–343, 12A–105
    - Cape Comorin, 12.1–269
    - Poona, 12.1–324
    - Trivandrum, 12.1–192
  - **Iraq,** 12.1–372
  - **Israel,** 12.1–228, 12.1–229, 12.1–254
    - Negev, 12.1–232
  - **Japan,** 12.1–426, 12A–153, 12A–169
    - Arima Spar District, 12.1–329
    - Kanto District, 12.1–266
    - Saga Prefecture, 12.1–386
    - Tokyo, 12.1–268
    - Yokusuka, 12.1–82
  - **Philippines**
    - Baguio, 12.1–143
  - **U.S.S.R.** (in Asia), *see also* U.S.S.R. *under* Europe
    - Kazakhstan, 12.1–59, 12.1–308
    - Siberia (Asiatic S.F.S.R.), 12.1–326
      - Altai Province, 12.1–56
      - Lake Baikal, 12.1–29
    - Tadzhikstan
      - Vakhsh Basin, 12.1–12
    - Uzbekistan
      - Tashkent, 12.1–27
- AUSTRALASIA
  - **Australia,** 12A–215, 12A–237
    - Macquarie Island, 12A–111, 12A–128, 12A–181
    - South Australia
      - Adelaide, 12A–250
  - **New Zealand,** 12A–78, 12A–144, 12A–145, 12A–146, 12A–236, 12A–237
    - Bluff, 12A–238
    - Christchurch, 12A–215
    - Invercargill, 12.1–425
- EUROPE, 12.1–320
  - **Central Europe,** 12.1–332, 12A–205

- **Alps,** 12.1–255
- **Austria,** 12.1–401, 12.1–402, 12.1–404
  - Austrian Alps, 12.1–419
  - Innsbruck, 12.1–344
  - Vienna, 12.1–410, 12.1–415
- **Belgium,** 12.1–227
  - Louvain Univ., 12.1–58
- **British Isles**
  - England, 12.1–319, 12.1–323
    - Beer, 12.1–380
    - Farnborough, 12.1–290
    - Jodrell Bank, 12A–100, 12A–116, 12A–118, 12A–248
    - Manchester Airport, 12.1–422
  - Scotland, 12.1–387
  - Varna, 12.1–433
- **Czechoslovakia**
  - Bohemia, 12A–217
  - Podersam, 12.1–424
- **Denmark**
  - Faeroes, 12A–206
  - Jutland, 12.1–63
- **France**
  - Haute-Provence Observatory, 12–58, 12A–59, 12A–60
  - Lyon Observatory, 12A–59
  - Meudon, 12.1–112
  - Mont Blanc, 12.1–91
  - Pyrenees, 12.1–48
  - Southwestern France, 12.1–49
- **Germany,** 12.1–309
  - German Democratic Republic, 12.1–51
  - Tübingen, 12.1–70
  - Schwerin, 12A–213
- **Greece,** 12.1–13, 12A–120
  - Budapest, 12.1–357
  - Lake Balaton, 12.1–369
- **Iberian Peninsula,** 12.1–398
- **Italy**
  - Bologna, 12A–147
  - Central Piedmont, 12.1–258
  - Montespertoli, 12.1–166
- **Netherlands,** 12.1–231, 12A–170, 12A–241
  - DeBilt, 12.1–331
  - Oosterbeek, 12.1–213
  - Witteveen, 12A–242
- **Norway,** 12A–68, 12A–244
  - Southern Norway, 12A–228
  - Tromsö, 12A–176, 12A–224
- **Pannonian Plain,** 12.1–347
- **Poland**
  - Inowrocław, 12.1–400
- **Romania,** 12.1–64, 12.1–208
  - Bicaz, 12.1–210
  - Dimbovicioara Cave, 12.1–411
  - Moldavia, 12.1–203
- **Scandinavia,** 12A–231
- **Spain**
  - Fuerteventura (Canary Islands), 12.1–423
- **Sweden,** 12.1–174
  - Kiruna, 12A–63
  - Ultuna, 12.1–316
- **Switzerland,** 12.1–32, 12.1–303
  - Aar-Rhone system, 12.1–214
  - Davos, 12.1–238
  - Geneva, 12.1–230
  - Linth-Rhine system, 12.1–214
- **U.S.S.R.** (European and General), 12.1–9, 12.1–28, 12.1–30, 12.1–35, 12.1–96, 12.1–198, 12.1–209, 12.1–307, 12A–39, 12A–193
  - Black Sea, 12.1–183
  - Northwest U.S.S.R., 12.1–207
  - Oka River Basin, 12.1–391
  - Sea of Azov, 12A–110

  - Armenia, 12.1–209
  - Azervaidzhan
    - Apsheron, 12.1–179
  - Estonia, 12.1–407
  - Georgia
    - Eastern Georgia, 12.1–206
    - Tiflis, 12.1–43
  - S.F.S.R.
    - Bashkir, 12.1–416
    - Devitsa River Basin, 12.1–391
    - Dubovskaya, 12.1–57
    - Moscow, 12A–125, 12A–165
    - Nikol'sk (Arkhangelsk), 12A–26
    - Salsk Steppe, 12.1–61
    - Tsimlyansk Reservoir, 12.1–285
    - Zelenogorsk (Leningrad), 12A–3
  - Ukraine, 12.1–136, 12.1–199
    - Chernigov Region, 12.1–392
    - Lvov, 12.1–260

NORTH AMERICA

- **Canada,** 12A–39, 12A–53, 12A–55, 12A–76
  - West Central Canada, 12A–121
  - Manitoba
    - Churchill, 12A–135
  - Newfoundland
    - Hopedale (Labrador), 12.1–194
  - Northwest Territories
    - Chesterfield, 12A–54
    - Ottawa, 12.1–89, 12A–28, 12A–96
  - Quebec
    - Anticosti Experimental Farm, 12.1–327
  - Saskatchewan, 12A–56
    - Saskatoon, 12A–52, 12A–115, 12A–134, 12A–141, 12A–191, 12A–209
- **Caribbean Region**
  - Antilles, 12.1–31
  - Barbados, 12.1–351
  - Cuba, 12A–4
    - Camaguey Province, 12.1–267
  - Martinique, 12.1–31
- **Columbia River Basin,** 12.1–341
- **Greenland,** 12.1–318
  - Eismitte, 12.1–326
  - South Greenland, 12A–200
- **Lake Huron,** 12.1–378
- **Mexico,** 12A–4
- **United States,** 12.1–197, 12.1–262, 12.1–311, 12.1–322, 12.1–366
  - Alaska, 12A–57, 12A–65, 12A–66
    - Barrow, 12A–122
    - College, 12A–11, 12A–13, 12A–14, 12A–33, 12A–61, 12A–101, 12A–132, 12A–172, 12A–204, 12A–214
    - Fort Greely, 12.1–321
  - California
    - Cactus Peak, 12A–196, 12A–204
    - San Diego, 12.1–186
    - Stanford Univ., 12A–189
  - Florida, 12.1–301
  - Georgia, 12.1–66
  - Idaho, 12.1–201
  - Illinois, 12.1–371
    - Peoria, 12.1–118
  - Massachusetts
    - South Dartmouth, 12A–79
  - Minnesota, 12.1–388
    - Minneapolis, 12A–251
  - Missouri
    - St. Louis, 12.1–118
  - Montana
    - Western Montana, 12.1–270

- Nevada
  - A.E.C. test site, 12.1–87
  - Nellis AFB (Las Vegas), 12.1–261
- New Mexico
  - Sacramento Peak, 12A–196
- South Carolina
  - Pontiac, 12.1–418
- South Dakota
  - Rapid City, 12A–197
- Washington, 12.1–201
  - Mt. Olympus, 12.1–390

OCEANS, SEAS AND ISLANDS

- **Antarctic Regions**
  - Antarctica, 12.1–19, 12.1–195, 12.1–325, 12A–18, 12A–85, 12A–98, 12A–85, 12A–98, 12A–99, 12A–148, 12A–208, 12A–218, 12A–236
    - Byrd Station, 12A–151
    - Dumont d'Urville, 12.1–276, 12A–249
    - Maudheim, 12.1–26
    - Syowa Base, 12.1–24
  - Argentine Antarctic, 12.1–25
  - Davis Sea, 12.1–195
- **Arctic Regions**
  - Arctic, 12.1–19, 12.1–193, 12.1–318, 12A–84, 12A–219
  - Arctic Basin, 12A–35
  - Franz Josef Land
    - Tikhaia (Calm) Bay, 12A–8
  - Spitsbergen
    - Cape Thordsen, 12A–30
    - Hornsund Fjord, 12.1–83
    - Longyear, 12A–176
- **Atlantic,** 12A–228
  - Iceland, 12A–206
  - North Atlantic, 12A–200
- **Indian,** 12A–136
  - Heard Island, 12.1–399
- **Mediterranean Region**
  - Malta, 12.1–365
- **Pacific,** 12.1–175
  - French Polynesia, 12.1–397
  - Johnston Island, 12A–77, 12A–149
  - North Pacific, 12.1–187, 12.1–188, 12.1–234, 12.1–235

SELECT LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or geophysics and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted. The form of serial entry adopted is given in bold face type below.

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TABLE OF CONTENTS

Meteorological and Geoastrophysical Abstracts, Volume 12, Number 1, January 1961

Editorial ii

Foreword iv

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

- A. General 1
  - 1. Collected Works 1
  - 2. Textbooks 2
  - 3. Monographs 4
  - 4. Manuals 5
  - 5. New Serials 6
  - 6. IGY—Arctic—Antarctic 7
  - 7. Conferences—Symposia 9
  - 8. Services—Observatories 9
  - 9. Education—History—Biography—Bibliography 11
- B. Applications 13
  - 1. Aeronautics 13
  - 2. Agriculture 15
  - 3. Forestry—Fire weather 18
  - 4. Medicine 21
  - 5. Radioactivity 23
  - 6. Industry 26
  - 7. Radio Communication 28
- C. Astronomy and Astrophysics 31
  - 1. Astronomy 31
  - 2. Astrophysics 31
  - 3. Astrophysical Instruments 32
  - 4. Solar Physics 33
  - 5. Moon 35
  - 6. Meteors 36
  - 7. Comets 37
  - 8. Radio Astronomy 38
- D. Outer Atmosphere 38
  - 1. Ionosphere 38
  - 2. Geomagnetism 41
  - 3. Astronautics—Satellites 42
  - 4. Auroras 44
- E. Solid Earth Geophysics 45
  - 1. Volcanology 45
  - 2. Seismology 45
  - 3. Tectonics 45
- F. Oceanography, Hydrology and Glaciology 49
  - 1. Oceanography 49
  - 2. Sea Ice 54
  - 3. Hydrology 55
  - 4. Glaciology 59
- G. Meteorological Observations and Instruments 61
- H. Synoptic Analysis and Forecasting 71
- I. Atmospheric Structure and Physics 76
  - 1. Atmospheric Composition 76
  - 2. Atmospheric Pollution 78
  - 3. Dynamics of the Atmosphere 83
  - 4. General Circulation 86
  - 5. Atmospheric Disturbances 87
- J. Radiation, Air and Soil Temperature 90
- K. Pressure and Wind 97
  - 1. Turbulence 98
  - 2. Upper Air Winds and Vertical Motion 103
- L. Aqueous Vapor, Hydrometeors and Hydrometeorology 106
  - 1. Humidity, Evaporation, Condensation, Fog and Cloud 106
  - 2. Precipitation, Rain, Snow and Hail 112
  - 3. Hydrometeorology 115
- M. Climatology and Bioclimatology 115
  - 1. Climatic Changes 118
  - 2. Microclimatology 119
  - 3. Bioclimatology 123
- N. Miscellaneous 124
  - 1. Optical Phenomena 124
  - 2. Electrical Phenomena 126
  - 3. Acoustical Phenomena 128

PART II. ANNOTATED BIBLIOGRAPHY ON AURORA, p. 129–180

PART III. TRANSLATIONS, RECENT MONOGRAPHS AND CONTENTS OF RECENT SERIALS AND COLLECTED WORKS, p. 181–206

PART IV. AUTHOR AND SUBJECT INDEXES

Index of Authors 207

Index of Subjects 212

Index of Geographical Locations 222

List of Periodicals .... Cover 3